The New England
Journal of Medicine

Copyright, 1939, by the Massachusetts Medical Society

VOLUME 220 MARCH 16, 1939 NUMBER 11

MASSACHUSETTS MEDICAL SOCIETY

Section of Radiology and Physiotherapy

THE X-RAY TREATMENT OF CANCER IN SMALL COMMUNITIES*

FREDERICK W. O'BRIEN, M.D.†

BOSTON

IT IS a truism that surgery, radium and x-ray, alone or in conjunction, may cure some of the varied manifestations of malignant disease commonly grouped under the inclusive term of cancer. At the same time it is recognized that special training, experience and judgment are required in order to utilize these curative agents successfully.

This special training is not obtained readily outside of large metropolitan hospitals, where segregated surgery may be practiced and radiation methods evolved on the basis of large series of cases studied from many angles. Where segregated surgery is not the vogue and cases are assigned in rotation, an individual surgeon during a year may operate on only a single case of cancer of the breast whereas 30 or more such cases are operated on yearly in the hospital. This shows the importance of the cancer institute, where cancer of certain anatomic regions and systems is operated on in the same manner by assigned surgical groups for a period of years, in order to obtain satisfactory data on which to predicate practical application of the knowledge thus acquired.

So too with irradiation. The methods of application are best developed at a cancer institute or large metropolitan hospital with an ample supply of radium for external and interstitial use, adequate x-ray apparatus capable of utilization over a wide range of potentials and an abundance of clinical material under a director of radiation therapy, who has the services of one or more competent physicists and the close co-operation of a tumor-clinic staff.

Fundamental as is intensive research in these institutes as to the cause of cancer, its possible control and its cure by natural or synthetic agents, surgery and irradiation continue in the forefront as the therapeutic mainstay. The number of cancer research centers now functioning in America is limited. The cost of increasing their number seems at present prohibitive despite our vaunted national wealth. Therefore, even though it is desirable for all cancer cases to have the benefit of study in such a highly specialized institute, it is not yet feasible. The cancer institute, however, is meeting the situation by training graduate physicians in clinical pathology, surgery and irradiation; they go forth each year, a small but an increasing group, some of them settling permanently in the small communities, and thus assuring sufferers from cancer outside of metropolitan centers intelligent care.

These special institutions have been functioning long enough in the study and treatment of malignant disease to have promulgated definite notions about the indications for and the limitations of surgery and irradiation in cancer therapy. This material has appeared in special monographs and current medical journals and is available for those who are interested.

The pathologist has taught the surgeon and the radiation therapist to evaluate the natural history of the tumor he is to treat. The informed surgeon no longer operates merely because a case is technically operable; the radiologist knows better when and where to irradiate. Thanks to the physicist, who has given him a standard of mensuration, data on erythema, tissue recovery rate and on ionization in the tissues, the radiation therapist knows how to irradiate, and understands some of the reasons for x-ray treatment. The treatment of cancer is no more a matter of envious competition but one of willing co-operation.

It is now fairly well agreed that high-voltage

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, June 2, 1938.

†Professor of radiology, Tufts College Medical School; visiting roentgenologist, Boston City Hospital.

x-rays, in the neighborhood of 200,000 volts, are probably adequate in the treatment of cancer amenable to x-ray therapy. The technic for the utilization of such high voltages has been well worked out as to filtration, distance, size of portals, surface and depth doses, time in relation to tissue effects, and end results, so that any trained radiologist can apply them.

If one can kill a third of all cancers of the breast by using 200,000 volts, it has been asked, why not use 1,000,000 volts and kill them all? Unfortunately, this is not a matter of arithmetical progression; there is more in cancer cure by irradiation than the mere magnitude of the potential. One argument often advanced for ultra-high-voltage x-rays is the greater depth dose which can be obtained by their use, but one does not always cure superficial cancer where the depth dose is presumably of little account.

So far as is known, it is absorbed radiation that produces biologic change. The shorter the wave length, the more penetrating is the ray. It is conceivable that radiation could be so penetrating, of such short wave length, that it would not be absorbed appreciably where most needed; this is in a measure what happens under certain conditions when 1,000,000-volt x-rays are used in treating the human body.

Quimby[1] demonstrated long ago, employing 200,000-volt rays and a 0.5 mm. copper filter, that increasing the distance from 50 cm. to 70 cm. increased the relative depth dose even more than would result from a doubling of the voltage. However, if filtration of the order of 5 mm. of copper is indicated, this would be uneconomical in certain 200,000-volt setups because of the lengthened duration of treatment. This disadvantage can be overcome by using ultra-high voltage of the medium range (400,000 to 500,000 volts). While the relative depth dose will not be appreciably greater than with 200,000 volts, the total dose that one may give with voltages of this higher range may be greater than can be given with 1,000,000-volt x-rays, since the dose at the surface of exit is not increased in proportion and the use of relatively large cross-fire portals is not thereby limited. Another practical factor to be considered is that with ultra-high-voltage therapy, while one is able to deliver more to the depths of thick parts than with 200,000-volt rays, the normal tissue surrounding the neoplasm receives the same increased dosage.

Indeed, the physicist describes voltages of 500,000 to 1,000,000 as modest voltages. Coolidge[2] recently stated that the range of an impulse generator employing the Marx circuit had been carried to 10,000,000 volts, and that it would apparently be a perfectly simple engineering and manufacturing undertaking to build one for several times this voltage. Brasch and Lange in Germany have already used the impulse generator, together with a novel type of gas tube, for voltages up to 2,400,000. But there is a vast hinterland between such an engineering accomplishment and its practical application in cancer therapy.

Of greater importance than all theoretical considerations regarding ultra-high voltages is their clinical effect. Any clinic that has had competent experience with ultra-high-voltage x-ray therapy has been most diffident in reporting unfortunate sequelae, and distrustful even of reputed benefits.

Mudd, Emery and Levi,[3] who in 1930 began a clinical study of the effect of ultra-high-voltage x-rays on inoperable carcinoma, report that irradiated carcinoma of the prostate is a disease which sometimes progresses slowly, so that the palliation achieved with 1,000,000-volt therapy is difficult to evaluate; that results in bladder carcinoma have not been reassuring; that results in rectal carcinoma have been disappointing; that in late stages of cancer of the breast there is little or no additional advantage in supervoltage therapy as against adequate irradiation with 200,000-volt rays; and that in carcinoma of the larynx and pharynx 200,000-volt rays provide sufficient ionization in the tumor-bearing regions involved. In fairness to them it should be said that many of their cases were not only inoperable but hopeless from the beginning. Doubtless with more hopeful cases to treat and surer knowledge of technic their results will improve. This does not mean that there is no place in the cancer institute for ultra-high-voltage x-ray generators, but it does mean that there is no justification for considering such generators as anything more than experimental, and as yet unsuitable for general clinical use.

If this be true, treatment of cancer by x-ray in small communities becomes a much more practical matter. With a proper physical setup, a 200,000-volt machine and a trained radiologist, it is not necessary to send patients on a long journey to a metropolitan centre to obtain x-ray therapy which can be had and applied intelligently in the home community.

It may be instructive to examine the situation in Massachusetts outside of Metropolitan Boston. High-voltage x-ray equipment suitable for cancer therapy is found in Cambridge, Newton, Salem, Beverly, Lowell, Quincy, Brockton, Fall River, New Bedford, Norfolk, Worcester, Gardner, Springfield, Westfield and Pittsfield, so that no one, with the exception of those living along the tip of the Cape, need travel much more than

twenty-five miles for adequate care. The nonambulant patient can be cared for comfortably since most of the apparatus is in hospitals.

To be sure, the possession of a high-voltage x-ray machine is not enough. That such a powerful agent for good or ill may be utilized as it should be, is now assured through the operation of the American Board of Radiology, which certifies on examination those qualified to practice x-ray therapy. I am happy to record that everyone in Massachusetts operating high-voltage equipment has been so certified, so that it would appear that the cancer patient in Massachusetts in need of this form of therapy may be treated adequately in our small communities.

Future advance in the x-ray treatment of cancer will probably depend on more certain knowledge of the biologic effects of radiation. Professor Crowther[4] says in a recent review that the first striking feature of any extended survey of the subject is the extraordinary difference shown by different tissues to the action of radiation. Mitosis is inhibited in a tissue culture by a dose of 120 r, but 13,000 r is required to produce even a delayed lethal effect. Apparently living material of any kind can be killed by a massive dose of radiation of the order of 100,000 r and upward. It is not surprising, Crowther adds, that a tissue culture can be killed by a dose of 100,000 r. What is surprising is that profound biologic effects can be produced in the same tissue with something like one thousandth of this dose.

The direct effect produced by the absorption of x-rays is ionization, upon which the biologic effect perhaps wholly depends, however long may be the chain that binds them. Ionization appears to be independent of wave length. The total ionization for equal intensities is probably the same whatever the wave length. Millikan,[5] however, says that the slower a negative electron moves, the more it is susceptible to deflection and the more frequently does it ionize the molecules through which it passes. Webster[6] points out that the short comma tracks produced by x-rays give rise within cells to more ionization per micron than do the longer tracks produced from the primary beam of ultra-high voltage and gamma rays. He says further that most biological experiments appear to show conclusively that if time and space distribution and intensity remain constant, the wave length is of little or no consequence. This is so with skin, lymph nodes, tumor cells, eggs and gene mutations.

Rather too much emphasis, I believe, has been placed on depth dose and lethal dose in cancer radiation therapy, and not enough on the normal physiologic response of the body economy through which modification of structure is brought about. This is an important link in the chain that connects biologic effect with ionization. There is an axiom in forensic medicine to the effect that there must be a suitable correlation between the weapon employed and the injury received. Until such a suitable correlation between ultra-high-voltage radiation and its effect has been demonstrated, the physician in the small community may feel confident, and may assure his cancer patient, that high-voltage x-rays of about 200,000 volts are adequate for the treatment of cancer, and that ultra-high-voltage x-rays produced by 1,000,000-volt generators continue to remain in the realm of experimental research.

465 Beacon Street.

REFERENCES

1. Quimby, E. H., and Marinelli, L. D.: The influence of filtration on surface and depth intensities of 200 k. v. x-rays. Radiology **21**:21-29, 1933.
2. Coolidge, W. D.: The production of x-rays of very short wave length. Radiology **30**:537-543, 1938.
3. Mudd, S. G.; Emery, C. K., and Levi, L. M.: Clinical observations in the treatment of cancer by supervoltage x-rays. Radiology **30**:489-492, 1938.
4. Crowther, J. A.: The biological action of x-rays — a theoretical review. Brit. J. Radiol. **11**:132-145, 1938.
5. Millikan: mentioned by Webster.[6]
6. Webster, J. H. D.: Wave-length as a factor in radiotherapy. Brit. J. Radiol. **11**:108-111, 1938.

Discussion

Dr. Richard Dresser, Boston: I have been much interested in Dr. O'Brien's comments on supervoltage radiation, that is on the effect of x-rays produced at potentials greater than the usual 200,000 volts. When I began my work in radiation therapy in Boston some fifteen years ago, there were only two machines in New England operating at this voltage, one at the Huntington Hospital and one at the Massachusetts General Hospital. This type of radiation was viewed with much skepticism both by radiologists and by the general profession. (It is an excellent scientific attitude to be skeptical of anything new until its worth has been proved.) Today there are more than a dozen 200,000-volt machines in operation in the hospitals of Greater Boston, and as many more have been installed in private offices. Radiologists are attacking the problem of therapy with increasingly greater enthusiasm and increased knowledge, and excellent work is being done, not only in Boston but in many of the small communities.

Today no one doubts the value of 200,000-volt radiation in the treatment of a great variety of malignant conditions. However, x-rays produced at lower potentials still have their place in the therapy of many superficial conditions, both malignant and benign. It is my belief that supervoltage radiation is now in the same stage of development that 200,000-volt therapy was fifteen years ago. I am certain that the shorter, more penetrating wave lengths derived from the higher voltages will be found to be more effective in the treatment of certain neoplasms, particularly those which are deep-seated, but that supervoltage radiation will not be used to the complete exclusion of low-voltage x-rays.

The advantages of supervoltage radiation which we have observed in our experience of a year and a half are as follows. In the first place, there is a greater tolerance of the skin to shorter wave lengths. It is therefore unnecessary to produce the severe erythemas which are

so frequently unavoidable with 200,000-volt treatment. Secondly, it is possible to deliver larger amounts of radiation to the deeper portions of the body. This is particularly true when small portals of entry are used. Thirdly, there is less general reaction — so-called roentgen sickness. Fourthly, the amount of radiation delivered below the surface is relatively independent of the size of the portal of entry. It is common practice with 200,000-volt radiation to use large portals of entry in order to increase the depth dose. This means irradiation of much normal tissue, which is unnecessary and even harmful. At higher voltages the portal of entry can be limited to cover only the disease-bearing area, without appreciable effect on the amount of radiation delivered to the tumor. Fifthly, there is possibly a selective action of the shorter wave lengths on neoplastic tissue, but this is still a moot point. Sixthly, it has been our observation that immediate regression of certain deep-seated neoplasms is more probable following supervoltage radiation than it is following 200,000-volt treatment.

The follow-up period on the cases which we have treated by supervoltage x-ray is too short for us to draw conclusions as to end results.

It should be kept in mind that radiation therapy is not a strictly technical procedure, and that success or failure depends on the training, judgment and ability of the radiologist more than on the apparatus at his disposal.

DR. O'BRIEN (closing): I have very little to add, gentlemen. The purpose of my paper was to try to prevent an unreasoned stampede to supervoltage therapy. Lest you think that I have an ax to grind, I may say I have installed and am operating a 400,000-volt machine in my private office. I am as anxious as anyone to have supervoltage x-rays utilized in an attempt at the cure of cancer, but I want to do it with an open mind.

The statements which Dr. Dresser made as to greater intensity and depth dose when using 1,000,000 volts nobody disputes from the physical standpoint, but their clinical application is another matter. Dr. Dresser failed to mention the disadvantages of 1,000,000-volt therapy, and this is the nub of the matter, for they are many. Something more than magnitude of potential is essential in the treating of tumors. While the relative depth dose at 1,000,000 volts is greater than that at 200,000, the total dose that one may deliver to a tumor may under certain conditions be greater with the latter. In thin patients very little is gained by using supervoltage. In heavy ones, if one uses small portals and avoids crossfire and overlapping on the opposite skin, supervoltage can be used to advantage. In crossfire technic the large doses on the surface of exit to which I have referred in my paper limit the practical value of the large depth doses.

As for the reputed greater skin tolerance, opinion is crystallizing that if one uses equal intensities and time-spacing the skin reaction is about the same. Regarding less roentgen sickness, we have had less since we started putting our tubes in oil, enclosing the high-tension leads and properly ventilating our treatment rooms. I know of no evidence that a 1,000,000-volt irradiation is more kindly to the intestinal mucosa than is one of 200,000 volts.

That the depth dose when using 1,000,000 volts is practically independent of the size of the portal employed is a physical fact of interest. But the fact that back scatter makes up a large part of the depth dose when using 200,000 volts does not constitute a valid argument in favor of one or against the other. If the skin effect is in reality less when supervoltage x-rays are used, this may be due to the wave lengths, which are of the order of gamma rays — although biologists working with seedlings and tissue cultures have not demonstrated any specificity.

Million-volt x-ray therapy is new only to Boston. Supervoltage therapy may prove to be a most potent force in dealing with cancer, but those who have employed it elsewhere for almost a decade are most guarded in evaluating it.

PHYSICAL THERAPY IN ARTHRITIS*

FRANK H. KRUSEN, M.D.†

ROCHESTER, MINNESOTA

THERE are three physical measures which may be used in the treatment of arthritis: heat; massage, manipulation and splintage; and exercise, postural training and rest. Unfortunately, the use of physical measures in the treatment of arthritis has been to a great extent neglected by the medical profession. There is a pronounced need for the more extensive application of such means in the home.

That there can be no doubt of the value of these methods is attested by leading experts in this field. Fox and Van Breemen[1] have said, "We rely to a great extent on physical medicine." Copeman[2] has said, "One of the most important advances of this century is the discovery that the human body can be influenced as much from the outside by physical methods as from the inside by medicinal methods." Hench[3] has stated that in the treatment of arthritis "physical therapy remains the most potent weapon at hand," and finally, Pemberton and Osgood[4] have asserted, "Any discussion of arthritis which does not at the same time develop, at length, the important field of physical therapy would be a medical incongruity."

REST

For all patients who have chronic infectious (rheumatoid) arthritis, rest should be prescribed in definite amounts, from a basic minimum of ten hours in bed at night and one hour of rest each morning and afternoon. A few patients may require slightly less than this amount of rest, whereas others may require somewhat more. During the acute stage of the disease rest is of cardinal importance. After this stage has been passed, the patient should be warned against traumatizing the joint by weight-bearing and instructed to avoid irritation from repeated aimless movements of the joints involved. He should never wiggle the affected joints. Instead he should carry through the full range of motion in each direction once a day. This attempt should be slow and rhythmic. Sir Robert Jones[5] has said, "No adhesions can occur in twenty-four hours which cannot easily be overcome."

The patient who has chronic infectious (rheumatoid) arthritis should avoid general fatigue rather than remain at absolute rest. He should avoid hurry and worry, and at the same time should take enough non-fatiguing general exercises to improve metabolism and posture. He should also take sufficient local exercise to maintain proper mobilization and alignment of the joints.

THERMAL AGENTS

Insufficient attention has been paid to the use of certain simple physical measures for systemic heating in the treatment of arthritis. Hot tub baths taken by the patient in his own bath tub may be of considerable value in increasing peripheral circulation and the general metabolism. The temperature of the water may range between 98 and 105°F. (36.6 and 40.6°C.) and the duration of the treatment may be between ten and forty-five minutes. At the beginning, the lower temperatures and shorter periods of time should be used. Asthenic and emaciated patients should be treated with caution. The full wet pack may also be used to advantage in the treatment of arthritis in the home. Furthermore, with a little ingenuity the physician may have constructed a simple cabinet or steam bath for applying heat to the surface of the entire body.[6]

Local heating of one or more involved joints may best be done with a simple home-made baker or a so-called clamp lamp, which likewise is inexpensive. The baker may be constructed by any tinsmith at the cost of a few dollars. It consists of a framework of strap iron supporting a curved piece of polished sheet tin beneath which four sixty-watt bulbs are placed in double sockets. Specifications for the construction of this apparatus may be obtained by writing to the secretary of the Council on Physical Therapy of the American Medical Association. The clamp lamp consists of a cup-shaped "photo-flash" reflector attached by a ball and socket joint to a small rubber clamp, which may be fastened to the back of a chair or the side of a bed. In the reflector is placed a two-hundred and fifty-watt Mazda CX bulb. I have described this lamp in detail elsewhere.[7]

The use of these luminous heaters is to be preferred to the use of the common electric heating pad. The latter often become too hot for proper local treatment, and we have discouraged their use because they are liable to burn the skin. Hench[8] has shown that the average low tem-

*From the Mayo Clinic, Rochester, Minnesota.
Presented at the annual meeting of the Massachusetts Medical Society, Boston, June 2, 1938.

†Head of Section on Physical Therapy, the Mayo Clinic.

perature of an electric heating pad is approximately 107.6°F. (42°C.), the medium temperature 181.4°F. (82°C.) and the high temperature 244.4°F. (118°C.). These temperatures are entirely too high for the local treatment of the average arthritic joint.

Physicians are occasionally faced with the problem of prescribing a method of local heating for patients who do not have electricity in their homes. We have experimented with special bakers heated by means of "canned heat"; however, these are comparatively expensive to operate and can be applied satisfactorily only to the extremities. Currently, therefore, we recommend the local application of ordinary paraffin.[9] Practically every patient has in his home a kitchen stove and a double boiler, and can obtain from the nearest grocery store several pounds of ordinary paraffin such as is used for sealing preserve jars. The patient is instructed to fill the outer container of the double boiler with water and place the paraffin in the inner container. The paraffin is then heated to the melting point and is allowed to cool until a thin film has formed on the surface. At this time, when the paraffin is at its low melting point, the temperature will be just tolerable to the human skin. The paraffin may then be painted over the involved joint with an ordinary paint brush or a smooth stick of wood wrapped in gauze or linen. About a dozen coats are applied successively and the paraffin is allowed to remain on the area to be treated for thirty minutes or an hour. It should never be applied over a hairy skin without preliminary oiling or shaving. Rarely, a patient's skin is sensitive to paraffin and a slight rash is produced.

On wrists, ankles or knees it is sometimes advisable to use a dressing of paraffin and gauze. The technic is simple. First a layer of paraffin is painted around the joint; next a few turns of gauze are applied to cover the first layer of paraffin. Successive layers of gauze and paraffin are applied until a thick, firm dressing surrounds the joint. Such a dressing will retain its heat for approximately one hour, and the dressing may be left on for twenty-four hours to provide a firm support for the joint. It should then be removed in order that massage and exercise may be administered prior to the application of a similar dressing.

In some cases of atrophic arthritis, applications of cold may be indicated. The so-called "Winternitz bath" has been used extensively in Europe. It consists of immersing the patient in a tub bath the temperature of which is a few degrees below that of the blood, and applying brisk, rapid friction to the surface of the skin during immersion. This seems to have a tonic effect and enables patients who are susceptible to cold to become tolerant to it gradually.

Frequently, alternate local applications of heat and cold are of benefit. For years specialists in arthritis have used contrast baths, particularly in the treatment of hypertrophic arthritis of the hands and feet. Some recent studies[10] indicate that they should be applied for longer periods than was formerly the custom. It now seems likely that periods of six minutes of heat and four of cold or seven minutes of heat and three of cold are most satisfactory for the average patient with chronic infectious (rheumatoid) or senescent arthritis. The hot water is kept at a temperature of approximately 113°F. (45°C.) and the cold water at about 45°F. (7.2°C.), and periods of thirty or forty minutes are devoted to each session.

HELIOTHERAPY

The use of ultraviolet irradiation is of occasional value in chronic infectious (rheumatoid) arthritis, particularly if there is severe asthenia and secondary anemia. If it is possible to apply direct sunlight to the entire body, Rollier's method of gradual insolation is usually most satisfactory.[11] If an artificial source must be used in the home, the so-called S-1 lamp is as satisfactory as any. At a distance of two feet it produces about the same quality and quantity of ultraviolet radiation as does June sunlight at noontime.

MASSAGE

Massage should not be used if there is acute pain on movement of the involved joint or if there is a rise of temperature in the region of the joint. As a rule, in cases of arthritis massage of the joints is avoided, although extremely light effleurage (or stroking) may occasionally be used for reflex relief of pain. As the condition improves, one may gradually increase the intensity of stroking and kneading of the muscles around the joint in an attempt to improve the circulation and tone of the muscle. We have found that it is possible for a skilled technician to instruct a member of the family in a few simple massage strokes which may be used to augment professional treatment.[6]

MANIPULATION

Vigorous manipulation applied only when the patient has been anesthetized may be a powerful weapon in the improvement of function in cases of quiescent, traumatic or infectious (rheumatoid) arthritis. Such manipulation is strictly an orthopedic procedure, and requires a great deal of experience for its proper application. Henderson[12] has stated that manipulation of this sort requires more experience than any other orthopedic procedure. It is therefore apparent that such manipulation should always be performed by skilled

hands. The joints which respond particularly well to such manipulation are those of the shoulder, hip and knee. It should always be remembered, however, that it is useless to straighten a knee unless the hip, ankle and foot of the same extremity are capable of functioning. The joints which respond in most cases very poorly to manipulation are the elbow joint, wrist joint and joints of the fingers.

It should always be remembered that it is often possible to manipulate arthritic joints gently without anesthesia by means of a procedure which may be termed "active assistive exercise." The patient makes an active effort to move the joint as nearly as possible through its full range of motion and is assisted by the operator in carrying the movement a little beyond this range. Applied slowly and skillfully once or twice a day just after the part has been heated and massaged, such a procedure frequently produces a gradual but great increase in range of motion. This active assistive exercise should always be attempted for at least three weeks before more severe measures under anesthesia are attempted. At no time should the operator jerk or pull the joint violently. He should apply pressure slowly, gradually and just short of producing severe pain. If there is still increased pain in the joint twenty-four hours later, it will be known that the measure was performed too severely, and that it should be discontinued for one or two days and then applied less strenuously than before. This same program of active assistive movement should always be started within twenty-four hours after a severe manipulation under anesthesia, in order that the mobility of the joint may be maintained. It is far better to give a strong sedative or narcotic and to exercise the joint early than it is to allow it to remain at rest until adhesions have formed.

It has been shown recently[13, 14] that traction and rotation of the cervical portion of the spine may relieve radiculitis secondary to hypertrophic arthritis of the cervical spine and involving the shoulder girdle, arm or precordium. This type of segmental neuritis is probably much more frequent than is generally recognized, and the application of heat, massage and traction by means of the Sayre head sling, with mild, forced rotation of the neck during traction, often seems to give considerable relief.

SPLINTS

In considering every case of chronic infectious (rheumatoid) arthritis, the physician should remember that, above all, every effort should be made to prevent deformities. Once deformities develop, it may take years to correct them. The chief deformities likely to arise in this type of arthritis are adduction of the shoulders, thoracic kyphosis with fixation, flexion of the elbows, wrists or knees, loss of abduction of the hips and foot drop. The proper application of splints will prevent such deformities.

The patient must always use a bed which does not sag. At least twice a day he should discard all pillows and fully extend all his joints for a half hour. Once deformities have developed, wedged casts or traction may be required to overcome contractures. It is particularly important to remember that such patients should avoid the constant use of pillows under the knees, because this is one of the most frequent causes of flexion contractures of the knees.

SHOES AND SUPPORTS

The physician should never permit the patient to wear shapeless bedroom slippers continually. Patients are frequently of the erroneous belief that such slippers are more comfortable than are shoes. As a matter of fact, they merely exaggerate deformities and are not nearly so comfortable as well-fitting orthopedic shoes equipped with a metatarsal bar on the sole just posterior to the transverse arch of the foot, heel pads or wedges, and a soft felt pad to support the longitudinal arch of the foot. Rigid metal arch supports are not to be favored, for they are not well tolerated by the patient who has arthritis, and they tend to produce pressure atrophy of the plantar muscles.[15] Elastic supports for the knee or ankle or properly applied ace bandages are frequently of value when applied to the knee or ankle, but are rarely of use for other joints. Sacroiliac belts occasionally afford considerable comfort.

EXERCISE

Exercise is always necessary in the treatment of chronic infectious (rheumatoid) arthritis. In Nature's warning, in the form of severe pain and acute cases in which motion is started prematurely, spasm, will usually prevent continuation of such motion. As soon as the patient starts wary voluntary motion, this is the signal for the inauguration of gentle passive motion by the operator. Exercises should be graduated slowly from passive motion to active assistive motion and, finally, to fully active motion. Knees should be exercised at first with the patient in the prone position in order to avoid the strain of weight-bearing. The knees should always be straightened as much as possible before walking is attempted. Exercises should be slow and rhythmic and through the fullest range of motion that is painless. One should always avoid jerking, wiggling and pump-

handle movements. One slow daily movement through the fullest, possible range of motion is preferable to many minor ones through a partial range of motion.

POSTURAL EXERCISES

Properly applied postural exercises rebalance the body as a whole so that there is better alignment of the joints and avoidance of strain. It has also been suggested[16] that postural exercises tend to promote normal visceral function. It has been pointed out[17] that hypertrophic arthritis always involves the points of greatest chronic strain in the spine, neck, fingers, knees and hips. With the exception of the fingers, all these joints are involved in bearing weight, and it seems logical to assume that postural exercises tend to lessen the strain on these joints by improving alignment. The patient who has arthritis and faulty posture should always be taught the following five cardinal exercises: walking with the feet pointed straight ahead and with the weight evenly distributed; rolling the hips under (contracting the gluteal muscles downward and the abdominal muscles upward, thus rotating the pelvis into a more level position); raising the chest; lifting the back part of the head toward the ceiling (thus straightening the dorsal and cervical spine); and walking, standing and sitting as erectly as possible.

Special attention should be directed toward exercises for the feet. Routine exercises for correction of pronated feet may often be in order.

EXERCISES UNDER WATER

Exercises performed under water may be of much value in the treatment of extensive chronic infectious (rheumatoid) arthritis. Some of these exercises may be done in the patient's own bath tub, or occasionally a Hubbard tank may be constructed.* The temperature of the water should vary between 98 and 105°F. (36.6 and 40.6°C.), and massage and exercises may be given under water during the period of maximal hyperthermia. If the palms of the operator are slightly oiled, he can massage under water without difficulty. It is possible by means of such baths to produce mild febrile reactions not unlike those produced by administration of typhoid vaccine. The bodily temperature may readily be raised within thirty minutes to 101°F. (38.3°C.). Movements can be carried through a greater arc with less pain under water, and because of the buoyancy of water, weak muscles are capable of a greater amount of work. Most observers agree that for a patient who has advanced infectious (rheumatoid) arthritis, the best way to start walking is in a pool.

OCCUPATIONAL THERAPY

Occupational therapy is extremely important in the rehabilitation of the patient with arthritis. For the knee, hip or ankle one may use a velocipede jigsaw or a stationary bicycle. For the ankle, one may utilize a foot pedal scroll saw or an ordinary sewing machine. For exercising stiff fingers and wrists, modeling with clay or hammering and planing is of value. For the shoulder, elbow and upper part of the back suitable exercises may be provided by having the patient do basket-making or loom-weaving, with the materials placed high enough to cause him to increase the upward range of shoulder motion as he works. A skilled occupational therapist can teach the patient many curative occupational procedures, most of which may be carried out at home.

HYDROTHERAPY

As previously mentioned, hot baths may raise the temperature of the patient above 101°F. (38.3°C.), and it has been shown by Currence[18] that they also increase the number of leukocytes, the circulation in the capillaries of the nail beds and the metabolic rate. The whirlpool bath may frequently be used to advantage in the treatment of arthritis involving the joints of the extremities. The part to be treated is placed in a bath of whirling aerated water at a temperature of 110°F. (43.3°C.), usually for thirty to forty-five minutes. Such a bath produces great dilatation of the peripheral capillaries, a soothing effect on the peripheral nerve endings and relaxation of the muscles. A simple whirlpool bath can be constructed for a few dollars.†

FIBROSITIS

This condition, which is described at great length in the Continental literature, is often unrecognized in this country. It consists of chronic inflammation of white fibrous tissue, and is particularly characterized by the formation of small palpable nodules in the subcutaneous tissue or muscles. It is of special interest to the physical therapist, because it has been claimed repeatedly that a certain type of very firm massage is of great value in treatment. It has been stated repeatedly by British authors that very firm local massage will "break up" many of the nodules, with subsequent relief from pain and muscle spasm. It would seem that American physicians should pay

*Specifications may be obtained from the Secretary of the Council on Physical Therapy of the American Medical Association, 535 North Dearborn Street, Chicago, Illinois.

†Specifications may be obtained from the Secretary of the Council on Physical Therapy of the American Medical Association, 535 North Dearborn Street, Chicago, Illinois.

more attention to this condition and to the use of firm massage in its treatment.[19]

FEVER THERAPY

The results of treatment of chronic infectious (rheumatoid) arthritis with prolonged fever therapy at the Mayo Clinic have not been particularly encouraging. Approximately 10 per cent of patients showed much improvement, and 20 per cent moderate improvement; the remaining 70 per cent showed little or no improvement.[20] On the other hand, daily fever therapy of short duration (thirty minutes), administered either in a tub or a fever cabinet, may be a valuable adjunct in routine physical treatment. In practically all cases, such short periods of fever therapy are followed by massage and exercise of the involved joints.

In cases of gonorrheal arthritis, prolonged fever therapy is of the utmost value, although, since the advent of sulfanilamide, fever therapy is not so frequently indicated as formerly. Our recent studies[21] indicated, however, that about 10 per cent of the patients who had gonorrhea failed to respond to sulfanilamide alone. In these cases we now recommend combined sulfanilamide and fever therapy. In 25 cases of gonorrhea in which a response to sulfanilamide failed to occur, a prompt response was obtained by this combination.

CONCLUSIONS

Physical measures are of very great value in the management of both chronic infectious (rheumatoid) and hypertrophic arthritis. Many of these may be used to great advantage in the home. It would be of particular advantage for the general practitioner to apply such procedures extensively.

REFERENCES

1. Fox, R. F., and Van Breemen, J.: *Chronic Rheumatism: Causation and treatment*. 370 pp. London: J. & A. Churchill, 1934.
2. Copeman, W. S. C.: *The Treatment of Rheumatism in General Practice*. 215 pp. Baltimore: William Wood & Co., 1933.
3. Hench, P. S.: Acute and chronic arthritis. *Nelson New Loose-Leaf Surgery*. Vol. 3. New York: Thomas Nelson & Sons, 1936. Pp. 104-175H.
4. Pemberton, R., and Osgood, R. B.: *The Medical and Orthopaedic Management of Chronic Arthritis*. 403 pp. New York: The Macmillan Co., 1934.
5. Jones, R.: The problem of the stiff joint. Brit. M. J. **2**:1019-1026, 1931.
6. Krusen, F. H.: Physical therapy of fibrositis. Arch. Phys. Therapy **18**:687-697, 1937.
7. *Idem:* A simple, inexpensive heat lamp. J. A. M. A. **107**:780, 1936.
8. Hench, P. S.: in discussion of the Fifth Annual Fever Conference, Dayton, Ohio, 1935. P. 87.
9. Krusen, F. H.: The simple paraffin bath as a means of applying heat locally when other means are not available. Proc. Staff Meet., Mayo Clin. **12**:73-75, 1937.
10. Collins, D.: personal communication.
11. Krusen, F. H.: *Light Therapy*. Second edition. 238 pp. New York: Paul B. Hoeber, Inc., 1937.
12. Henderson, M. S.: Physical therapy and the management of stiff joints. Arch. Phys. Therapy **17**:562-566, 1936.
13. Hanflig, S. S.: Pain in the shoulder girdle, arm and precordium due to cervical arthritis. J. A. M. A. **106**:523-526, 1936.
14. Turner, E. L., and Oppenheimer, A.: A common lesion of the cervical spine responsible for segmental neuritis. Ann. Int. Med. **10**:427-440, 1936.
15. Hench, P. S., and Meyerding, H. W.: The results of failure or neglect in the care of chronic infectious (atrophic) arthritis: the characteristic deformities and their prevention. M. Clin. North America **18**:549-571, 1934.
16. Swaim, L. T.: The orthopaedic principles in the treatment of chronic arthritis. J. Bone & Joint Surg. **8**:845-857, 1926.
17. Goldthwait, J. E.; **Brown, L. T.**; Swaim, L. T., and Kuhns, J. G.: *Body Mechanics in the Study and Treatment of Disease*. 281 pp. Philadelphia: J. B. Lippincott Co., 1934.
18. Currence, J. D.: Recent hydrotherapeutic observations in arthritis. Arch. Phys. Therapy **15**:490, 1934.
19. Krusen, F. H.: *Physical Therapy in Arthritis*. 180 pp. New York: Paul B. Hoeber, Inc., 1937.
20. Hench, P. S.; Slocumb, C. H., and Popp, W. C.: Fever therapy; results for gonorrheal arthritis, chronic infectious (atrophic) arthritis, and other forms of "rheumatism." J. A. M. A. **104**:1779-1790, 1935.
21. Elkins, E. C., and Krusen, F. H.: Fever therapy in resistant gonorrhea; with especial reference to its relationship to sulfanilamide therapy of gonorrhea. Proc. Staff Meet., Mayo Clin. **13**:299-303, 1938.

DISCUSSION

DR. FRANK OBER, Boston: I think we are very fortunate in having a man like Dr. Krusen here. He is one of the real pioneer preachers of good physical therapy. He is a member of the Council of Physical Therapy of the American Medical Association, and his words and advice are always well considered and timely.

In Massachusetts a few years ago the Governor appointed a commission to study the health laws of the state and their rejuvenation. Dr. Osgood was chairman of the section on adult hygiene, and Drs. George Minot, Walter Bauer, Robert Greenough, Elliott Joslin, William Robey and I were members of the section to study cancer, diabetes, circulatory diseases and arthritis. After we went into the situation very thoroughly and carefully, we came to the conclusion that the first thing required in the treatment of these chronic diseases, especially arthritis, was brains. We thought that if we had a large metropolitan hospital, it would probably be put in the center of population of Massachusetts and would be nothing but an almshouse. The section recommended to the legislature that a few beds be set aside in a hospital for the care of arthritic patients. Dr. Chadwick, the commissioner of health, sat in on all meetings and heard all the arguments pro and con. Finally, a year ago the legislature raised a sum of money, which was set aside for the care of patients with chronic arthritis, and these funds are being spent at the Massachusetts General Hospital, where Dr. Bauer has been conducting research work in arthritis for eight or ten years.

The next step will probably be to set up some form of home treatment for the arthritic patient. This is very vital, because there are too many arthritic cases in Massachusetts for all to be housed in institutions. There is not money enough to build more institutions, and we have not enough personnel to carry them on if the money were available. We certainly have not enough educated personnel to manage more than one or two, so it seems unwise to advocate large institutions for the handling of arthritic patients. The treatment should therefore be carried on at home. Furthermore, the patient is a little happier there. We do need a place where the patient can go through a sort of clearing station for study and care of all the aspects of his joint condition. The family and the family physician should be brought into the picture because they will be responsible for the care of the patient.

The care of the arthritic patient comes under three heads. First, medical: there is no point in taking care of an arthritic joint until one finds out what is the matter with the patient. Secondly, orthopedic treatment: the orthopedic surgeon has come to acquire a special knowledge of joints and of the manipulation of painful ones, necessary because so many can be injured by poor massage. Deep massage and passive manipulations, by ignorant persons, have ruined many a good joint that might otherwise have been saved. Finally, there is the application of physical therapy measures which have been pre-

scribed by the doctor and the orthopedic surgeon at the proper time.

As to heat, it is important for the arthritic patient to keep warm if he is a bed patient. If he gets chilled at night he is sure to have an uncomfortable day. There are occasional patients who cannot stand heat in any form, and it should not be forced upon them. I have a patient who keeps her room temperature at 60 degrees all the time. If it rises to 65 or 68 degrees she is always uncomfortable. Heat may be overdone in the care of arthritis in general. In reference to massage, it is impossible to massage arthritis out of joints, and I do not believe that we can massage fibrous masses out of muscles, especially out of tendons, where they are prone to occur.

Rest, of course, which Dr. Krusen spoke of at the end, is one of the most important factors in the management of this disease. Rest of the patient, if ill, and rest of the joint—two considerations for rest. One needs to know whether the joint is the so-called hypertrophic or degenerative type, or the so-called atrophic or proliferative type. The first type will not ankylose. It will lose motion if enough bone is formed by overexercise to irritate the joint. In the proliferative type, which is prone to ankylosis, we must have movement. The movement should not be through the whole range of the normal joint motion, but within the range of discomfort. Thomas splints should be used with the patient in bed, with an overhead arrangement of pulleys, splints jointed at the knees and ankles, elbows and shoulders, so that they can be run by the patient. They can be built at home with little difficulty with a frame over the bed, a gaspipe apparatus or some posts hung on the corners of the bed.

When patients go through these motions, they should be taught how to use their muscles actively. Passive motion alone will irritate a joint, because passive motion tears the delicate joint membrane, and every time the joint membrane is torn pain and muscle spasm occur — an effort on the part of nature to splint the joint. Small hemorrhages take place in the joint, and there is an increase in the ankylosing type of tissue. The early motion should be active plus passive. A patient who has an acute arthritic joint — a knee, for instance — cannot stand very much motion. The first thing we have to combat is pain, which we can do with medication of some sort, plus a splint. The patient is then taught how to contract rhythmically the muscles that control the joint. That is, the first effort to improve the physiology of a knee joint is to teach the patient how to tighten and relax his quadriceps muscle. The quadriceps muscle in an inflamed knee is always atrophied. It is impossible for this patient to walk on an inflamed knee which has not muscle power enough to support the body weight on his leg when he is erect. The exercise should be done every hour by short rhythmic contractions and relaxations, not hard enough to produce pain. These exercises improve the tone of the skin, the circulation and the muscles and combat bone atrophy. When we combat bone atrophy we are on the road to combating atrophy of the cartilage, which is one of the factors in the production of ankylosis of these arthritic joints. As soon as these patients have enough muscle to hold the knees straight against gravity we can begin active exercises.

It is a bad practice to splint a joint indefinitely. If there is an ankylosing type of arthritis of the knee, and the knee is kept in a plaster cast, bone atrophy increases and as a result the joint collapses. Ankylosis then occurs. The splints must be removed once or twice a day for exercise in order to stimulate the joint function. The mere setting of the muscle will do so.

It is unfortunate that many ready-made shoes do not fit properly. There are over four hundred million pairs of shoes produced in the United States every year, and they do not fit anybody accurately. We might as well go out and buy window glass for spectacles as to buy shoes the way we do. It is for this reason that a shoe has to be rebuilt by the surgeon. If we have a pronated foot that is kept pronated by spasm of the peroneal muscles, we cannot apply the sort of shoe that Dr. Krusen advocates because it works against the spasm of the muscle. One has to apply a shoe that allows the foot to be pronated until the spasm has gone from the muscles or until manipulation has relieved the tension of the muscle.

No force should ever be used on an ankylosed type of arthritic joint, because it will do nothing but irritate the joint.

One of the symptoms of arthritis of the neck is pain at the root of the neck. In addition, there may be pain going down the arm along one or more or all the nerves of the brachial plexus. The Sayre head sling, which most orthopedic surgeons have used for years, is a very simple apparatus for use in this contraction. A good brace shop will make up a leather sling for very little money. One needs a double and a single block of the awning type, awning line and an awning screw and the header of a closet doorway. The patient sits in a chair and is instructed to pull on the rope and stretch his neck very slowly and very gradually. He should not pull more than eight or ten times twice a day. Some of these patients are inclined to pull themselves off the chair and wonder why they have so much pain in their necks.

Often associated with this type of arthritis we have chronic headache and sometimes chronic sore throat. Chronic headache at the base of the skull is caused by spasm of the trapezius muscle. It is sometimes referred all the way over the skull to the eyebrow. In a great many cases where no other cause for the headache can be found, it may be discovered that severe arthritis of the cervical spine is the producing factor. The use of the Sayre sling is of great help in these cases.

When these patients are able to stand they usually have a bad posture because they have been ill for a long time. They must have corrective exercises for their postural difficulties.

The Marie Strümpell type of arthritis, that is, the ankylosing type, which usually affects the spine oftener in men than women (about 9 men to 1 woman), is a very disabling condition. These patients usually go around bent over at the waist. Once in a while one sees a patient walking about the streets of Boston with his hands almost on the sidewalk. Whenever it is suspected that a patient has arthritis of the spine, the chest should be measured, since one of the early symptoms in this type of arthritis is diminution of the respiratory excursion. It may be as little as a quarter of an inch. These patients must have deep breathing exercises, preferably lying on the floor, on a hard surface. They need something to increase the chest expansion; this helps a little bit in diminishing their deformity. Occasionally patients with chronic arthritis get flexion contracture of the hip, the muscles becoming shortened. One patient I saw not long ago, a man about six feet tall, had developed a 35-degree flexion contracture of the hips; being a very intelligent man but very much depressed, he said, "My one difficulty is that I cannot look my fellow man in the face. If I could be sure that I could look him straight in the eye once in a while, I should feel much better from the psychological point of view." His flexion deformity was relieved by dividing his contracted

hip fasciae. Getting rid of 35 degrees of hip flexion contraction allowed him to stand up straight and he began to improve in his general condition within three or four weeks.

We have found underwater exercises in the early stages of arthritis in children very valuable. These children are taught to do their exercises under water.

A good many patients claim that after a good night's sleep they do not feel so well the next morning. They conclude from this that they are much worse. Now, patients who are uncomfortable through the night are usually better in the morning because they have had physical therapy throughout the night. In other words, every time they have turned over in bed they have been awakened and have had to move their joints in various positions. Thus, a patient who is awake at intervals during the night is usually better in the day. In other words, their joints do not get a chance to stiffen up as they do when they sleep a long time in one position.

Sometimes one may think that a patient's joints are worse. The patient may complain that he feels very much more uncomfortable than he did a month before. He thinks he has had a new attack or an increase in the arthritis. If there is a sudden disappearance of fluid and the membranes in that joint come together, the two surfaces rub against each other and the patient has more pain. This does not mean that he is worse. These patients usually take two or three days to recover under rest and then go on again for a month or two. The swelling of the joint membrane gradually decreases, and then there is another attack of pain. One finds that there is a little less thickening and a little smaller joint, but there is a little more rubbing and grating than before. It does not mean that there is a recurrence or increase in the arthritis.

Another word about heat. Heat never cured arthritis. Dr. Krusen knows as well as I do that there is a great effort being made in this country to sell every doctor a short-wave diathermy machine. The propaganda for heat therapy and short-wave diathermy machines is going on at a great pace. I do not know how many different machines there are — probably over a hundred. You can buy them from $145 to $4500. It looks to me as if everybody would have a short-wave diathermy machine to treat all sorts of diseases. One cannot treat arthritis with heat alone. There must be a variety of treatment — a finding out of what is the matter with the patient and getting rid of it by the medical man, splinting and care of joints by an orthopedic surgeon, and the use of heat, massage and exercise by the physical therapist.

Dr. George R. Minot, Boston: Dr. Krusen has given us an excellent exposition of a most important form of treatment to be used in arthritis.

In the treatment of this disease, there are certain principles to keep in mind: to improve all functions of the body and to modify or to remove any basic causes. The difficulty very often is that we do not know what the basic causes are. We must make adjustments to lessen the burden of the handicapped organism. It is important to know intimately one's patient. Time must be spent obtaining a detailed history and becoming sufficiently acquainted with the individual to understand his reaction to his fellow men, to his home, his environment, his country, to all those problems of life often spoken of as social aspects of medical cases. If one thoroughly understands the patient as a human being, one will be able to aid him.

As has been mentioned by Dr. Krusen and Dr. Ober, rest is undoubtedly of the utmost importance in treatment. Physical therapy is going to help us gain that rest. You remember Dr. Krusen explained that following the use of packs the individual is relaxed and goes to sleep. Anything we can do to gain rest, physical or mental, is going to be of advantage to the patient. Rest means more than going to bed. One who has gone to bed may become very restless, have tense muscles, be worried, be overactive mentally, be unduly anxious. Merely saying that he should take a rest or go to bed for an hour will accomplish nothing. Each patient presents a separate problem. A precise program of rest, adjusted to the given case, can be prescribed intelligently only after one thoroughly understands the patient, including his reactions to other individuals and his environment. The goal is to obtain habitual relaxation and tranquillity.

An acquaintance with Jacobson's studies on progressive relation can be serviceable in aiding these patients. Relaxation does not mean simply diversion. Indeed, rest may mean extraordinarily different things to different people. I recall a woman with rheumatoid arthritis who was advised to rest for an hour in the morning, an hour in the afternoon, with clothes off, in bed. She became progressively worse. At the end of about two months it was realized that those in charge of her case did not know exactly what she did when she "rested." On inspection of the home and finding out the exact circumstances of her rests, it was learned that they consisted of lying on the bed with the telephone beside her, which she answered whenever it rang and sent messages. Furthermore, she kept pencil and paper in hand and constantly made notes regarding many sorts of matters to be attended to. She was lying down; that meant rest to her.

A policeman was advised to rest; nothing more was said to him about this matter. Rest to him meant diversion. He thus took his family in his automobile from Boston to the Pacific Coast in about twelve days.

One must prescribe rest. To some individuals that may mean diversion; to others to become a complete sloth. Just as rest may mean different things to different people, we must realize that the word fatigue, as L. J. Henderson has pointed out, can be applied to many different conditions. The word fatigue is used, for example, for feelings arising from utterly different physiologic processes, for example from lack of oxygen, from low blood sugar, from that condition associated with high atmospheric pressure, high humidity and heat. There are other disorders that can lead to a condition that individuals describe by the word fatigue, for example dissatisfaction caused by emotional tension.

The exact type of rest to be prescribed for fatigue varies according to the nature of the case. In all cases, however, it is relief from strain that has to be secured, and it is often a difficult duty and a difficult thing to do, because it means very often adjusting a person to what appears to be antagonistic tendencies. Even so, if every patient with rheumatoid arthritis could at the beginning follow out a program of rest somewhat comparable to what you would advise for an early case of tuberculosis, there would probably be a good deal less of advanced arthritis. One must, however, utilize many measures to adjust the individual to all his altered physiologic conditions.

Exercise has been mentioned; it is important, and must be carried out as Dr. Krusen and Dr. Ober have indicated. Those who do best are those who persevere and follow out directions given by a physician who has optimism, and who knows how to aid these patients psychologically as well as physically.

I am not going to discuss other methods of treating the various forms of chronic arthritis, but I will mention diet. There is no specific diet for arthritis. You must consider

the patient as a whole. Is he overweight; underweight? Is he by any chance allergic to any food? What is the state of his gastrointestinal tract? The problem very often becomes one of considering the whole individual's nutritional state combined with the condition of his intestinal tract, without there being any particular or specific diet. Besides a diet suitable for optimal nutrition, it is perhaps wise in certain cases to give an excess of those substances the action of which may be impaired in the face of infection, such as some vitamins and minerals.

Our aim must be to restore normal physiologic processes. Physical therapy is certainly one measure. There are others which demand attention to the patient as a whole; his mental as well as his physical status should not be neglected. Much can be accomplished by caring not only for the disease but also for the individual himself.

DR. KRUSEN (closing): I am extremely grateful to Dr. Minot and to Dr. Ober for adding to my remarks. These brilliant discussions have indicated that this subject is very complicated, and a number of important points which I was unable to cover in my presentation have been mentioned.

With regard to the institutional treatment of arthritic patients, it should be stressed that from the physical therapeutic standpoint great progress will not be made until each hospital possesses an organized department of physical therapy conducted under medical supervision. It is not the custom in modern hospitals to permit the clinical laboratory to be managed by a group of lay technicians without medical supervision. One would never think of allowing a department of roentgenology in a hospital to be under the complete supervision of a group of technicians without a medical director. Similarly, lay technicians should not be permitted to conduct a department of physical therapy without direct medical supervision. It is impossible for a lay individual to make the essential contacts with referring physicians concerning diagnosis and treatment. If physical therapy is to develop properly, there must be competent medical supervision of the departments of physical therapy in hospitals throughout the United States.

Physical therapy is a specialized field of knowledge. Despite the fact that there has been a tendency among some medical groups to consider that physical therapy is not a separate specialty and that it should be used by practicing physicians only as needed in their own particular fields, there are physicians specializing in this field of medical treatment. It is true that practically all physicians should make some use of physical therapy, leaving the more complicated procedures to the elaborately equipped departments of physical therapy in hospitals.

Although a physician may perform simple laboratory tests in his own office, he avoids doing Wassermann tests or complicated examinations of the blood in his office. A physician may utilize a small portable x-ray apparatus in his own office, but he depends, if he is wise, on the department of roentgenology in the hospital for more elaborate roentgenologic diagnosis and treatment. Thus, although a physician may use certain simple devices for physical therapy in his own office, he should rely on the specialist in that field for more elaborate methods of treatment. There can be no question that at the present time physical therapy is a specialty, and that there are many good physicians specializing in this field.

At the Mayo Clinic last year, approximately one twelfth of all the patients were referred to the Section on Physical Therapy for some type of treatment or instruction.

As Dr. Ober has pointed out, there are some patients who are more comfortable without heat. One might go even farther and point out that in certain cases patients may be benefited by applications of cold. The so-called hardening treatment *(Abhärtung)* for the patient who has arthritis may be used to relieve his abnormal sensitivity to external cold.

Dr. Ober mentioned active and passive exercise. I prefer to use the phrase "active assistive exercise" because the patient makes an active effort to move the part and is assisted by the physician or technician in further movement. I do not agree that these movements should always be painless. If pain does not last for more than two hours after manipulation and if a flareup does not occur on the following day, as a rule the manipulation has not been too great.

Quadriceps-setting exercises are important, as stressed by Dr. Ober. The physician would do well to learn to perform this muscle-setting exercise himself. It is then easier for him to show the patient how to perform it.

I have purposely avoided too much discussion of diathermy. I have reviewed this subject recently in an article which appeared in the *Journal of the American Medical Association*. Short-wave diathermy, in my opinion, does not produce specific biologic or physiologic effects other than those attributable to heat. However, one may produce deeper heating with short-wave diathermy than with any other method of heating tissues, and from this standpoint it is of value. Occasionally there are cases of arthritis in which short-wave diathermy may be of value, but they are few. It has been claimed that one can destroy the gonococcus in vivo by means of local applications of short-wave diathermy. This is probably not true.

As far as can be determined, short-wave diathermy is not capable of producing any great selective heating effects in the living human body, because the very efficient circulation rapidly equalizes the heat in the various tissues.

One final point which was mentioned by both Dr. Ober and Dr. Minot, and which I desire to stress, is the problem of rest. I feel that this problem is very important. In the clinic where many cases of acute arthritis are encountered, one is likely to overstress the value of rest, whereas, as Dr. Hench has pointed out, in the clinic where many chronic cases are seen, there is a likelihood that the value of exercise will be overemphasized.

At Rochester we probably see an excess of chronic cases, and therefore we may stress exercise unduly. The problem is not so much one of exercise as of mobilization. The patient should be physically rested and at the same time should have the joints mobilized. For example, the patient who has static senescent arthritis of the knee should avoid bearing weight, but the knee should be kept mobilized by means of active assistive exercises. The patient who had advanced, chronic infectious (atrophic) arthritis may awake after ten hours of sleep more fatigued than when he went to bed. This seems to indicate that rest alone is not the solution of the problem.

I am very glad that Dr. Minot mentioned relaxation and the work of Dr. Jacobson, because it would seem that routine training and relaxation should benefit certain types of patients who have arthritis. Occasionally, an intelligent patient may be told to obtain Jacobson's book for the layman entitled *You Must Relax*.

In conclusion, I believe that this discussion has indicated definitely that the management of each patient who has arthritis is an individual problem, and usually a most complicated one. The entire subject of the use of physical agents in the treatment of arthritis deserves much more attention than it has received in the past.

RADIATION THERAPY IN THE TREATMENT OF INFLAMMATORY LESIONS*

FRED O. COE, M.D.†

WASHINGTON, DISTRICT OF COLUMBIA

ROENTGEN-RAY therapy in the treatment of inflammatory lesions has been used to some extent since the early days of x-ray, but only during more recent years has a large enough experience been gained for such therapy to command the attention that it deserves. In 1916 Dunham[8] published an article on the treatment of carbuncles with roentgen ray. Since that time there have been a steadily increasing number of reports of satisfactory results in treating inflammatory processes.

Acceptance of this method of treatment has probably been delayed by fear on the part of clinicians that it would result in those reactions sometimes associated with the irradiation of new growths. It should be understood that the treatment of inflammatory processes constitutes an entirely different field from that of malignant neoplasms. In the latter the aim is to give the maximum dose of radiation without irreparable damage to the underlying and surrounding structures, while in the former a very small dose is sufficient. In fact, the optimal amount of radiation is so small that it usually produces no skin changes and no appreciable untoward systemic effect. It may be stated without qualification that x-ray treatment of inflammatory lesions with proper dosage is harmless. Fortunately there is also considerable latitude to the permissible amounts and quality of radiation. The lower limit is indefinite, as there have been reports of beneficial results in mastoiditis following the routine radiographic study of the mastoids.[16] There is also a wide variation in the voltages which can be used — from 50,000 to 200,000 volts. Experience has proved that the upper limit of dosage should not ordinarily exceed one half an erythema unit.

Radiation therapy was at first empirical, and many diseases were treated that did not respond favorably. There was no adequate explanation of the favorable responses in certain diseases. Today it is known that lymphoid cells are the most sensitive to roentgen ray of all the cells in the body. These include the lymphocytes in the spleen, lymph nodes, circulating blood, tonsils and other structures. Such cells are destroyed by relatively small doses of radiation. Next to the lymphocytes in sensitivity to irradiation are the polymorphonuclear leukocytes and the eosinophils. Warthin[18] found a rapid, almost explosive, destruction of lymphocytes within fifteen minutes after irradiation. At first thought one would not consider the destruction of lymphocytes and polymorphonuclear leukocytes to be a good therapeutic measure, as they are the productive agencies in combating disease, but in accordance with the theory of Fried,[5] it has been found that the destruction of leukocytes by irradiation within advisable limits apparently liberates antibodies, ferments or some bactericidal agent which brings about the prompt subsidence of the inflammation. What this substance is and how it increases phagocytosis has never been demonstrated, and the clinical results must be taken as proof of the efficacy of such treatment. That the beneficial effect is not due to direct action of the x-ray on the bacteria seems to be well proved by numerous experiments in which bacterial cultures were irradiated in vitro without destructive effects. Mohler and Taylor's experiments[10] show that it is very improbable that a bacterium would receive a lethal dose from the usual irradiation used in the treatment of inflammatory diseases. Desjardins[1] suggests that variation in effectiveness in different cases may be due to variation in the degree of the leukocytic infiltration of the offending lesion. A survey of some of the disease processes which have been cured or benefited by x-ray therapy shows that the same principle applies throughout; that is, if there is leukocytic infiltration with a high percentage of lymphocytes, irradiation alone or in conjunction with the usual therapeutic agencies such as heat or serum usually brings about a rapid termination of the disease process. In general, the more marked the inflammatory process and the earlier it is treated, the better the results.

Let us now examine the methods and results of x-ray therapy in a few of the inflammatory conditions in which it has been used in enough cases to demonstrate its value.

PUERPERAL MASTITIS

Pfalz[18] in 1934 reported his experimental and clinical results in puerperal mastitis. This work

*From the radiological laboratories of Drs. Groover, Christie and Merritt. Presented at the annual meeting of the Massachusetts Medical Society, Boston, June 2, 1938.

†Professor of radiology, Georgetown University School of Medicine, Washington, District of Columbia; radiologist to Georgetown University Hospital.

is typical of the methods used and the results obtained in the treatment of inflammation. He produced mastitis in guinea pigs by intramammary injection of *Staphylococcus aureus*. The lesions were then treated with 320 r of roentgen ray. It was found that, on the average, irradiation shortened the course of the disease and usually prevented breaking down of the tissues. Wright's opsonic and leukocytic indices were used in determining the changes in blood immunity produced by x-ray. In early infections these indices were raised after irradiation; in advanced suppuration they increased or remained constant. With this experience as a basis for treatment, Pfalz treated 41 cases of human mastitis with small doses (50 to 60 r) of x-rays. The series included both early and late cases. This method of treatment proved distinctly superior to other forms. There were no ill effects and no disturbance of lactation. We have treated a small number of cases of postpartum mastitis, and have had uniformly good results. In the cases which were referred in the early stages of the disease, there was prompt subsidence without suppuration. Unfortunately, most of the cases were referred late; the usual treatment with ice pack had already been used and the inflammation had continued to spread. Following x-ray therapy the pain increased for about six hours and then usually subsided; the process became localized, and either there was spontaneous rupture of the abscess or surgical intervention was resorted to, with drainage of the localized abscess. In all cases the referring obstetricians believed that the x-ray therapy shortened the course of the disease and localized the process. The dose given was 160 r at 112,000 volts, filtered through 3 mm. of aluminum. This was repeated if necessary in three days. In no case did the treatment interfere with subsequent lactation.

ACUTE MASTITIS

Among 500 cases of inflammatory lesions treated there were 32 of acute mastitis. Five of these were in male adolescents. The breast and often the axillary glands were painful. Trauma was of etiologic importance in some cases. Usually there was no known predisposing factor. In none of the cases was there any suggestion of malignancy. The results of treatment were excellent, and the inflammation subsided after one to four treatments, without suppuration. A dose of 160 r was given the first day, followed by 100 r on alternate days until four treatments had been given.

FURUNCLES AND CARBUNCLES

X-ray therapy is especially successful in the treatment of furuncles.[3, 6] If the case is seen early, before the induration is great, resolution without suppuration may be obtained in a large percentage of cases. It is also beneficial in the later stages in bringing about softening and localizations as well as prompt healing of the incision if one is necessary. The most striking effect in both furuncles and carbuncles was the quick relief from pain, nearly always within twenty-four hours and usually in six to eight. Excellent results were obtained in recurring crops of furuncles, in the absence of such underlying diseases as diabetes.

Radiation therapy is of the greatest use in furunculosis of the upper lip, nose and face. When the infection is of sufficient virulence, there is marked lymphangitis and thrombophlebitis. Infection from facial lesions not infrequently spreads early to the vessels of the brain, with a fatal termination. In our series of 27 cases there have been no such catastrophes, and all the infections have subsided without complications. If there is believed to be a mixed infection with the hemolytic streptococcus as one of the etiologic agents, the administration of sulfanilamide is advisable along with radiation therapy. The lesion should never be treated surgically. In a few cases it is necessary to give blood transfusions, especially if the process does not localize within the first twenty-four hours.

ERYSIPELAS

In erysipelas, streptococci localize in the connective tissue spaces and in the lymph vessels, and chiefly in the most superficial layers of the chorium. They produce a cellular exudative inflammation of the skin and subcutaneous tissues. The disease usually lasts eight to fourteen days. Many reports of successful roentgen treatment have appeared in the literature for years. We have treated many cases, in both adults and infants. Radiation is practically specific so long as the disease remains local. The dose used is 160 r at 112,000 volts through 3 mm. of aluminum, not only over the entire area involved but also well beyond the margin of the lesion.

PNEUMONIA WITH DELAYED RESOLUTION

Musser and Edsall[11] in 1905, and Edsall and Pemberton[4] in 1907 reported on x-ray therapy in cases of delayed resolution. My associates, Drs. Merritt and McPeak,[9] in 1930 reported on a series of such cases treated with roentgen radiation. Of the 7 cases reported, 4 underwent complete resolution, 2 were markedly improved and 1 was unchanged. We have treated many cases since the above report, with favorable results. It is believed that irradiation should be instituted if resolution does not take place at the time when it is usually ex-

pected. There have been no untoward symptoms following treatment.

LOBAR PNEUMONIA AND BRONCHOPNEUMONIA

Since the excellent report by Powell[14] on roentgen therapy of lobar pneumonia we have treated 13 cases of pneumonia with irradiation. Our results were quite as favorable as those reported by Powell. In 6 of these cases the type of pneumococcus was not reported; however all were clinically diagnosed as pneumonia, and all showed radiographic evidence of lobar consolidation. Five patients recovered either by lysis or crisis. One had consolidation on the left side which cleared rapidly after irradiation. A few days later there was a rise in temperature and a radiograph of the lungs revealed a beginning consolidation on the right side. The clinician refused to have radiation applied to this area and the patient died, this being the only death in the entire series. Of the 7 other cases, 3 were due to Type 1, 1 to Type 3, and 2 to Type 4; 1 was diagnosed as bronchopneumonia, the type not being reported. Five patients recovered by crisis and 2 by lysis. All these cases were treated with a dose of 200 to 300 r at 200,000 volts through 0.5 mm. of copper, applied over the area involved. Only one treatment was required in most cases, and two in a few others. Crisis took place in most cases within twenty-four hours after treatment, and the usual course of the disease was much abbreviated. Radiation therapy is undoubtedly of marked benefit in this too common disease, and should be used more generally. We have found no harm resulting from moving the patient to the x-ray room for therapy.

CERVICAL ADENITIS

It has been known for many years that cases with either tuberculous or acute cervical adenitis respond to x-ray therapy.[8, 14] Such treatment is now well recognized as a method of choice in tuberculous adenitis, but only more recently has such treatment for adenitis accompanying the acute and chronic infections of the upper respiratory tract received wide attention. Pfahler and Kapo[12] in 1934 reviewed 333 cases of cervical adenitis of varying degree, both acute and chronic. They, and also their surgical colleagues, were convinced of the superior therapeutic value of roentgen irradiation. The majority of the patients were cured in from two to four treatments, with no skin atrophy and no telangiectasis. Hurwitz and Zuckerman[8] reported an experimental study of this method of treatment in children. Alternate cases admitted to the ward were selected for radiation treatment as the only form of local therapy. The others were treated by the usual medical procedures, — compresses and ointments, — and served as controls. General nutritional measures were the same in each group. Only cases with marked enlargement of the lymph nodes, potentially suppurative, were included. The symptoms included fever (100°F. or over), local pain at the site of the swollen nodes, anorexia, sleeplessness, irritability and occasional stiff neck. There was usually accompanying pharyngitis, tonsillitis or otitis. Staphylococci and streptococci were cultivated from the throat and nodes. The cases treated with radiation slightly outnumbered the controls because toward the end of the study, since x-ray treatment had proved obviously superior to other therapeutic measures, all patients were so treated. The authors make the following observation with regard to the immediate effect of treatment:

> "One of the most striking results of roentgen therapy was the rapid improvement in the constitutional symptoms. A pronounced drop in temperature occurred in twelve to forty-eight hours with marked relief of pain and discomfort in the majority of cases. . . . The swelling receded and resolution was complete in a shorter time than occurred when the usual medical procedures were employed. In an occasional instance, within a few hours after radiation, there was a temporary exacerbation of symptoms with increased temperature and local swelling. This reaction subsided within twelve to twenty-four hours and no untoward effects remained. With the small dose of x-rays employed, symptoms of radiation sickness, such as nausea and vomiting, were not encountered. Skin reactions did not occur."

A partial summary of the results are as follows:

> "Sixty-two children with acute cervical adenitis were treated with small doses of roentgen rays. Resolution occurred in 52 (83.9 per cent) cases, while 9 (14.5 per cent) terminated in suppuration. In a group of 21 adequately controlled hospitalized patients who were irradiated, 17 (81 per cent) were cured as opposed to 10 (58.8 per cent) treated by other measures. Suppuration resulted in 3 (14.3 per cent) of the cases treated with x-rays as opposed to 7 (41.2 per cent) in the control group."

In the large series of cases we have treated, the results have been so satisfactory that all the cases at one of our hospitals are now referred for x-ray therapy. If the node becomes fluctuant, it is aspirated with aseptic technic, thus giving good cosmetic results. The dosage given is 100 to 160 r at 112,000 volts through 3 mm. of aluminum. The treatment is repeated on alternate days until three have been given.

SINUSITIS

My associate, Dr. Rathbone,[15] has recently reported on the favorable results obtained in the x-ray therapy of diseases of the accessory nasal sinuses. The matter is of extreme importance because sinus disease in children is now known to be

exceedingly common. The primary sinusitis is often obscured by the manifestations of recurrent colds, bronchitis, otitis media, recurrent attacks of pneumonia, bronchial asthma or cervical adenitis.

It seems certain that a considerable percentage of such cases can be cured by x-ray treatment and a certain smaller percentage greatly improved.[12, 13] As the number of our cases increases, the more firmly are we convinced of the efficacy of the treatment, if the cases are chosen with discretion. The technic used is 100 to 120 r at 112,000 volts through 5 mm. of aluminum to each area, repeated until six series of treatments have been given. The three areas used are the right and left lateral face and one anterior face.

SUMMARY

Cases of inflammatory diseases make up one third of all those referred to our laboratories for x-ray therapy. Their relative frequency is as follows: cervical adenitis, cellulitis, furunculosis, mastitis, sinusitis, bronchitis, carbuncle, pneumonia, breast abscess and erysipelas, with a few others of infrequent occurrence.

X-ray therapy of inflammatory diseases has proved a valuable and safe agent in the hands of qualified radiologists and its field of use is being extended daily. The best results can be achieved when there is a close co-operation between the referring doctor and the radiologist in the management of all such cases.

REFERENCES

1. Desjardins, A. U.: Radiotherapy for inflammatory conditions. J. A. M. A. **96**:401-408, 1931.
2. Dorrance, G. M.: The treatment of chronic infection of the parotid gland. Am. J. Roentgenol. **33**:803-806, 1935.
3. Dunham, K.: The treatment of carbuncles by the roentgen ray. Am. J. Roentgenol. **3**:259, 1916.
4. Edsall, D. L., and Pemberton, R.: The use of the x-rays in unresolved pneumonia. Am. J. M. Sc. **133**:286-297, 1907.
5. Fried, C.: Bakterizidie nach Röntgenbestrahlung. Strahlentherapie **21**:56-72, 1925.
6. Hodges, F. M.: The roentgen ray in the treatment of carbuncles and other infections. Am. J. Roentgenol. **11**:442-445, 1924.
7. Holzknecht, G.: Roentgen treatment of spontaneous post-traumatic and post-operative coccus infections and suppurations. Am. J. Roentgenol. **15**:332-336, 1926.
8. Hurwitz, S., and Zuckerman, S. A.: Roentgen rays in treatment of acute cervical adenitis. J. Pediat. **10**:772-780, 1937.
9. Merritt, E. A., and McPeak, E. M.: Roentgen irradiation in unresolved pneumonia. Am. J. Roentgenol. **23**:45-48, 1930.
10. Mohler, F. L., and Taylor, L. S.: A note on bactericidal effects of roentgen rays. Am. J. Roentgenol. **34**:89-91, 1935.
11. Musser, J. H., and Edsall, D. L.: A study of metabolism in leukemia under the influence of the x-ray. Tr. A. Am. Physicians **20**:294-323, 1905.
12. Pfahler, G. E., and Kapp, P. J.: Roentgen treatment of cervical adenitis; review of 333 consecutive cases. Am. J. Roentgenol. **32**:293-300, 1934.
13. Pfalz, G. J.: Über Wesen und Wert der Röntgenschwachbestrahlung bei puerperaler Mastitis. Tierexperimentelle Studien immunbiologischen hämatologischer und histologischer Schwachstrahlenwirkungen. Strahlentherapie **49**:357-406, 1934.
14. Powell, E. V.: Roentgen therapy of lobar pneumonia. J. A. M. A. **110**:19-22, 1938.
15. Rathbone, R. R.: Roentgen therapy of chronic sinusitis in children. Am. J. Roentgenol. **38**:102-109, 1937.
16. Schillinger, R.: The apparent therapeutic effect of the roentgen ray upon the clinical course of acute mastoiditis (preliminary report). Radiology **18**:763-776, 1932.
17. Smith, H. B., and Nickel, A. C.: The treatment of subacute and chronic sinusitis by roentgen radiation. Am. J. Roentgenol. **39**:271-273, 1938.
18. Warthin, A. S.: An experimental study of the effects of röentgen rays upon the blood-forming organs, with special reference to the treatment of leukemia. Internat. Clin. **4**:243-277, 1906.

Discussion

Dr. Jack Spencer, Boston: This stimulating paper again reminds us of the value of x-ray treatment of certain infections. We have all seen the striking action of x-ray treatment of erysipelas, and the efficacy of radiation in the treatment of infections about the nose. These are now appreciated to such an extent that practically all early cases are treated by x-ray. Postoperative parotitis may be added. In this group of cases the mortality has been decreased from 60 per cent where radiation is not used to about 20 per cent where it is.

The success in the use of this valuable adjunct to the treatment of infections should make us realize the importance of familiarizing ourselves and our associates with its worth, not only in this group where one of the most important therapeutic agents is radiation therapy, but also in that large group of cases discussed in this paper, where x-ray treatment is a valuable adjunct. As stated, one third of the cases in the reader's clinic were referred for radiation of inflammatory lesions.

I am pleased to learn that Dr. Coe and his associates are so conservative with their roentgen doses, giving from one third to one half of a skin erythema dose, thus avoiding any possibility whatsoever of skin changes.

We have all profited by this paper, which contains a wealth of information. I am sure it is a stimulus to us to use radiation in more of the infections which we see.

REPORT ON MEDICAL PROGRESS

SURGERY OF THE SYMPATHETIC NERVOUS SYSTEM

REGINALD H. SMITHWICK, M.D.*

BOSTON

THE clinical importance of surgery of the sympathetic nervous system is becoming more certain from year to year. Much can now be accomplished to alleviate suffering and to improve function which was impossible even a few years ago. The full scope of this type of surgery is unknown as yet, and further progress in this field may be expected in the future.

The detailed anatomy and physiology of the sympathetic nervous system is quite complicated. Various aspects have been well described by White[1] and others.[2, 3] The facts necessary for everyday clinical application may be summarized in a comparatively simple manner.

From the anatomical viewpoint, we should first realize that this system is represented by a continuous nerve trunk which lies in the paravertebral region on either side of the spinal column, and extends from the base of the skull to the end of the spine. It is divided into the cervical, thoracic, lumbar and sacral portions. Every few centimeters along its course is an enlargement, called a ganglion. There are three in the cervical region, usually twelve in the thoracic portion, corresponding to each rib, four in the lumbar, and four or five in the sacral area.

We are concerned chiefly with the thoracic and upper lumbar areas, because it is only in these that any connection with the central nervous system exists. Thus, so-called communicating rami run between the thoracic and upper two or three lumbar ganglia and the peripheral nerves, over which impulses may pass from the central to the sympathetic nervous system or vice versa. These are known as white rami. Other rami, grey, also exist, but are of importance chiefly as a method of distributing impulses, which have already entered the previously described portion of the sympathetic nervous system, to all organs and tissues of the body, or to transmit impulses from remote areas back to the thoracicolumbar portions of the sympathetic trunk. Thus it is seen that we are dealing with two pathways, first, a motor or efferent and, second, a sensory or afferent pathway. In this respect, the sympathetic nervous system can be compared to an ordinary peripheral nerve, such as the sciatic.

The motor pathway, starting in the lateral horn of the grey matter of the spinal cord, passes out over the anterior root of an ordinary peripheral nerve, then gains the sympathetic trunk by passing over a white communicating ramus and terminates in a ganglion. It then commences again, this interruption being known as a synapse. Instead of continuing as a single fiber, however, many fibers arise which eventually terminate in some organ or tissue and pass over grey rami in their course. The first portion of this motor pathway is known as the preganglionic division, and the second as the postganglionic. One preganglionic fiber thus controls the destiny of many postganglionic fibers. This differentiation is important because we have learned from long experience that the best clinical results are obtained by interrupting the first or preganglionic rather than the second or postganglionic portion of the pathway.[4, 5]

The sensory or afferent pathway is less complicated and has no interruption from its origin in a viscus to its termination in a posterior-root ganglion of a peripheral nerve. Moreover, the various organs of the body have a segmental reference in the spinal cord (Table 1).

TABLE 1. *Location of Referred Pain.**

ORGAN	SUPERFICIAL AREA OF REFERRED PAIN	SEGMENTAL CONNECTIONS OF AFFERENT NEURONES
Spinal cord (meninges)	Side of scalp and face	T 1 – T 2
Heart	Precordium and inner arm	T 1 – T 5
Esophagus	Substernal region	T 5 – T 6
Liver and gall bladder	Right upper quadrant and right scapular region	T 7 – T 8
Stomach	Epigastrium	T 7 – T 8
Small intestine	Umbilical region	T 9 – T 10
Colon	Suprapubic region	T 12 – L 2
Kidney	Loin and groin	T 12 – L 2
Ureter	Loin and groin	L 1 – L 2
Bladder	Suprapubic region	T 10 – L 2
Uterus	Suprapubic region and low back	T 12 – L 2

*The tabulation varies slightly from that suggested by White.[1]

While the pelvic viscera have a segmental reference in the lower thoracic and upper lumbar segments of the cord, the great majority of both the motor and sensory pathways can apparently be interrupted by resection of the superior hypogastric plexus. This lies between the common iliac arteries, on the anterior surface of the body of the fifth lumbar vertebra in a retroperitoneal position.

It is helpful to think of the sympathetic network as a very complicated affair in the peripheral portions of the body, but as a much more simple affair as we approach the spinal cord. There is a "bottle neck" through which impulses must pass

*Assistant in surgery, Harvard Medical School; assistant visiting surgeon, Massachusetts General Hospital.

to and from any particular part of the body in order to leave or enter the central nervous system. The problem is to find the "bottle neck." In many instances this is now known beyond any doubt, in others we are in the process of learning. It seems certain however, that if the correct operation is performed, excellent and lasting effects can be obtained.

We now believe that interruption of sympathetic pathways is indicated in a number of well-recognized clinical conditions. These are best divided into two groups, depending on whether the motor or sensory pathway is concerned.

The result to be expected in any case can be determined by preliminary study. Both motor and sensory pathways can be blocked temporarily by novocain in a number of ways.[1] Other important tests are also utilized. Space does not allow a discussion of these. One should understand, however, that operation is not undertaken unless it has first been demonstrated that the effect will be beneficial.

Surgery of the Motor Pathways

Peripheral Vascular Disease. By far the largest general field of application for surgery of the motor pathway is in the treatment of peripheral vascular disease. Many patients suffer from inadequate blood flow to the extremities for a variety of reasons. In some cases, decreased circulation may be largely the result of vascular spasm, as in Raynaud's disease and allied disorders. In others, obliteration of the main vessels is present, and the element of spasm is minimal or absent. Arteriosclerosis with associated diabetes is an example. Other patients suffer from a combination of obliterative vascular disease and vascular spasm, such as is found in thromboangitis obliterans or Buerger's disease. When vascular spasm alone is present, brilliant results may be expected from a properly executed sympathectomy. When obliteration of main vessels is the cause of impaired circulation and spasm is absent, interruption of sympathetic pathways is not helpful and is not indicated. When a combination of the two factors is present, sympathectomy may be indicated and, if so, usually results in an improved circulation which is lasting and beneficial.

Most cases of peripheral vascular disease may be fitted into one of these three groups as a result of clinical study and tests designed to determine the amount of vascular spasm which may be present.

Anterior Poliomyelitis. Impaired circulation to the lower extremities may follow infantile paralysis. This situation, of course, is not to be grouped among primary vascular diseases, and is complicated by extreme muscular weakness, atrophy and diminished blood flow to the skin and subcutaneous tissues. In extreme examples with cold, moist, cyanotic, ulcerated extremities, sympathectomy may be indicated. If properly done, the results have been helpful.

Hyperhidrosis. Distressing examples of hyperhidrosis may be completely relieved by sympathectomy. There are occasional individuals who suffer from excessive perspiration which may involve all four extremities and cannot be controlled by medical measures. When present to this degree, it may be a great occupational and psychological handicap. Interruption of sympathetic pathways to such extremities causes complete abolition of sweating, as well as a vasomotor paralysis, and the results are regarded as extremely satisfactory by these patients.

Sudden Arterial Occlusion. Sympathectomy may be an important adjunct to other forms of therapy in the case of sudden occlusion of peripheral arteries. This may be the result of embolism or thrombosis. It may be associated with primary disease of the peripheral artery or may, in the case of the upper extremity, be complicated by cervical ribs, anomalous first ribs or the scalenus anticus syndrome. The primary lesion should receive first consideration, but we realize that vascular spasm plays an important secondary role. If eradication of the primary lesion does not relieve the secondary spasm, or if the primary lesion is not amenable to surgical approach, sympathectomy may be indicated. Space does not permit an adequate discussion of this important group of cases.

Sympathetic Surgery of the Extremities. The technic of operations designed to cause sympathetic denervation of the extremities has been reported in detail.[6, 7] In general it may be said that these procedures carry a minimal risk (a fraction of 1 per cent) and a short period of disability, and are now very well standardized. It seems unlikely that there will be any essential variations from the present technic in the future. Surgical excision of appropriate areas is the procedure of choice.

Paravertebral alcohol injection may be utilized as an alternative method. This is distinctly a second choice, as the results are usually incomplete, are not permanent and may be followed by distressing and prolonged peripheral neuritis, and so far as the motor pathway is concerned, such injections are done only when the general condition of the patient or the benefit to be gained does not appear to justify the operation of choice.

Hirschsprung's Disease. Congenital dilatation of the colon (Hirschsprung's disease) is believed to

be neurogenic in origin. There appears to be an improper balance between the sympathetic (inhibitory) and the parasympathetic (motor) innervation of the colon. Beneficial results have been reported following lumbar sympathectomy when the imbalance is chiefly confined to the left colon. Resection of the splanchnic nerves as well may be necessary if the right colon is involved.[8]

Essential Hypertension. Surgical attempts to alleviate high blood pressure of unknown etiology have stimulated widespread interest in this problem. The internist,[9] the surgeon and the physiologist[10, 11] are all concerning themselves with the study of essential hypertension. As a result of such combined effort, it is to be hoped that a clear understanding of the nature of this malady will result.

Sporadic attempts to lower blood pressure by sympathectomy have been made in the past,[12] but most of the cases are of only a few years' duration, so that the results are difficult to analyze. A number of operations[13–18] have been devised, the purpose and the effects of which are similar.[19–24]

It is commonly thought that high blood pressure is due to increased peripheral resistance to blood flow. By sympathectomy, this resistance is presumably decreased so that a lower blood pressure level results.

It has been shown that significant blood-pressure changes follow extensive sympathetic denervation of the splanchnic bed and that a normal blood-pressure level may result from such an operation without harm to any organs or tissues of the body, and with relief of distressing symptoms which may result from high blood-pressure levels. This effect may be lasting, and many patients have had normal blood-pressure levels for from two to six years after such a procedure. It has been demonstrated that the best results are obtained in young age groups with variable blood pressure levels and with minimal evidence of organic changes in the eyes, heart and kidneys.

Even under these circumstances the results are not uniform. Moreover, our experience during the past five years shows that results as described above are obtained only in 40 to 50 per cent of the favorable cases. The experience of others is similar. In the groups with advanced organic vascular changes, a material lowering in blood-pressure levels can be expected in only 5 or 10 per cent of the cases, although symptomatic relief may be marked.

The surgical attack on this disease must still be regarded as in an experimental stage. It takes many years of trial and error to determine the most effective method of denervating any portion of the vascular bed, and the lack of uniformity of results in identical cases leads one to suspect that this has not as yet been accomplished with regard to the splanchnic bed. Further observation of late results will be necessary to determine the indications for and the true value of sympathetic surgery for this disease.

Surgery of the Sensory Pathways

A knowledge of the sensory pathways from various organs to the central nervous system and of their segmental reference in the spinal cord is of primary importance because of its diagnostic possibilities. In this way one can explain why pain arising in an organ as the result of what happens to be an adequate stimulus for that particular viscus will be felt by the patient in a certain region. It is often referred peripherally over a number of segments adjacent to the white rami over which the impulse passes to reach the posterior root ganglia. Tension is the usual stimulus which results in visceral pain. In the case of peripheral arteries and muscles the stimulus is probably the result of increased concentration of acid metabolites in the tissues.

Pain in the Head, Face and Arms. One is occasionally confronted with the problem of pain in the head, face and arms, and the afferent sympathetic pathways are often concerned. That this is the case, can be determined by diagnostic paravertebral novocain block of the upper two or three thoracic segments. It is interesting to note that when relief from novocain alone is immediate and striking, it may last for weeks or months. Permanent relief of atypical neuralgias of the head and face may follow resection of the inferior cervical and upper two dorsal sympathetic ganglia.

Causalgia. Following injuries or infections of the hand, an exceedingly painful causalgia may result. These cases present most distressing problems. As a rule, both motor and sensory sympathetic pathways are involved, as well as the somatic sensory nerves. There may also be a local fault in the form of scar tissue, a neuroma or an unsatisfactory amputation stump. In some instances sympathectomy may have to be combined with excision of local scar tissue and resection of the peripheral sensory nerves. A similar lesion of the lower extremity is occasionally seen.

Angina Pectoris. Paravertebral alcohol injection of the upper four or five dorsal segments on one or both sides, as indicated by the distribution of referred pain, has resulted in lasting and satisfactory relief of pain in cases of intractable angina pectoris. In skillful hands, practically complete re-

lief of pain should result in 75 per cent of cases and moderate relief in 10 or 15 per cent, while failures should not occur in over 10 per cent. This procedure carries a low mortality rate (1 to 2 per cent) as contrasted with a rate of 25 per cent as the result of operative procedures of any magnitude. Painful peripheral neuritis lasting several weeks usually follows the injection. Aortic-arch pain due to aneurysms may be treated in a similar manner, and the results have been extremely satisfactory.

Pain from Abdominal Viscera. One is rarely called on to treat referred pain from abdominal viscera. As a rule, abdominal surgery for the lesion itself is indicated. However, in the case of severe pain referred to a given area from extensive cancer, such as lesions in the liver, relief may be obtained by paravertebral alcohol injection.

We have had several occasions to treat referred pain arising from the biliary and upper gastrointestinal tracts by paravertebral alcohol injections or splanchnic resection. In these particular cases the results were most satisfactory. In one, repeated operations on the common duct failed to relieve severe colic, which was later controlled by resection of the right splanchnic nerves. In two others, severe referred pain from posterior-wall, penetrating, duodenal ulcers was relieved by paravertebral alcohol injection, as the condition of the patients did not justify eradication of the lesion itself.

Genitourinary-Tract Pain. In certain cases sympathectomy may be helpful in dealing with problems involving the genitourinary tract. This is particularly true of the relief of pain, although some improvement in abnormal motor function of the bladder may be expected under the proper circumstances.

The bladder has a triple nerve supply, and it is the function of the sympathetic portion to permit filling of this organ. Sympathetic impulses cause relaxation of the bladder wall and contraction of the internal sphincter. Parasympathetic impulses produce the opposite effect. When the latter pathway is damaged, inability to empty the bladder results in a large residual and, later, damage to the kidneys from back-pressure and infection. Under such circumstances, resection of the sympathetic supply by excision of the superior hypogastric plexus has given good clinical results. One should be certain, however, that the third source of nerve supply — the somatic nerves arising from the third and fourth sacral segments — is intact, as paralysis of the external sphincter contraindicates excision of the sympathetic nerves. The information necessary to make a decision in a given case can be obtained by a combination of cystoscopy and paravertebral novocain block.

Renal and ureteral colics of unknown etiology have been relieved by interruption of the afferent sympathetic pathways. The kidney itself can be denervated by careful resection of the sympathetic plexus about the renal vessels. Ureteral pain has been relieved by dividing its nerve supply throughout its length and by displacing the ureter laterally to aid in preventing regeneration. Lumbar sympathectomy should also help in such cases.

Bladder pain is a more complicated matter, as the sensory nerves pass over three different pathways — the sympathetic, parasympathetic and somatic. The sympathetic pathway is perhaps the least important, and for this reason resection of the superior hypogastric plexus alone has not yielded very satisfactory results in the treatment of such conditions as tuberculous cystitis, interstitial cystitis and cancer, except where the lesions are chiefly confined to the trigone and about the ureteral orifice. Resection of the superior hypogastric plexus and removal of the upper three sacral ganglia, combined with carefully controlled intrathecal alcohol injections, have given good results in a variety of painful bladder conditions.[25] It must be emphasized that resection of the superior hypogastric plexus in men may result in inability to ejaculate and consequent sterility.

Very satisfactory results have been obtained by resection of the superior hypogastric plexus for dysmenorrhea. This should, of course, be done only in the most intractable cases. Resection was first suggested by Cotte[26, 27] and has proved satisfactory in the hands of others. Meigs[28] has contrasted the results in 20 cases in which resection alone was done with those in 7 cases in which other procedures such as dilatation of the cervix and suspension of the uterus were carried out in addition to resection. In the first group, satisfactory results were obtained in 75 per cent of the cases, while in the second group, complete relief of symptoms followed in all but 1 patient. Sufficient observations are on record so that it may be stated that no material change in the menstrual cycle follows, and pregnancy and parturition are not affected by this operation. Satisfactory relief of pain also followed this operation in cases of advanced cancer of the cervix and uterus in which bony metastases and involvement of pelvic nerves had not taken place.

319 Longwood Avenue.

REFERENCES

1. White, J. C.: *The Autonomic Nervous System: Anatomy, physiology, and surgical treatment.* 401 pp. New York: Macmillan Co., 1935.
2. Livingston, W. K.: *The Clinical Aspects of Visceral Neurology.* 254 pp. Springfield, Illinois: Charles C Thomas, 1935.
3. Davis, L.: *Neurological Surgery.* 429 pp. Philadelphia: Lea & Febiger, 1936.
4. Freeman, N. E.; Smithwick, R. H., and White, J. C.: Adrenal secretion in man; reactions of blood vessels of human extremity, sensitized by sympathectomy to adrenalin and to adrenal secretion resulting from insulin hypoglycemia. Am. J. Physiol. **107:**529-534, 1934.
5. Smithwick, R. H.; Freeman, N. E., and White, J. C.: Effect of epinephrine on the sympathectomized human extremity; additional cause of failure of operations for Raynaud's disease. Arch. Surg. **29:**759-767, 1934.
6. Smithwick, R. H.: Modified dorsal sympathectomy for vascular spasm (Raynaud's disease) of upper extremity; preliminary report. Ann. Surg. **104:**339-350, 1936.
7. Smithwick, R. H.: *The Sympathetic Nervous System and Vascular Disease.* The Practitioner's Library of Medicine and Surgery. Vol. 13. New York: D. Appleton-Century Co., 1938.
8. Adson, A. W.: Hirschsprung's disease; indications for and results obtained by sympathectomy. Surgery **1:**859-877, 1937.
9. Page, I. H.: The nature of hypertension. Bull. New York Acad. Med. **13:**645-654, 1937.
10. Goldblatt, H.: Experimental observations on the surgical treatment of hypertension. Surgery **4:**483-486, 1938.
11. Heymans, C.: Some aspects of blood pressure regulation and experimental arterial hypertension. Surgery **4:**487-501, 1938.
12. Pieri, G.: Tentativi di cura chirurgica dell'ipertensione arteriosa essenziale. Riforma med. **48:**1173-1180, 1932.
13. Peet, M. M.: Splanchnic section for hypertension: preliminary report. Univ. Hosp. Bull., Ann Arbor **1:**17, 1935.
14. Adson, A. W., and Brown, G. E.: Malignant hypertension; report of case treated by bilateral section of anterior spinal nerve roots from sixth thoracic to second lumbar, inclusive. J. A. M. A. **102:**1115-1118, 1934.
15. Craig, W. M.: Surgical approach to and resection of splanchnic nerves for relief of hypertension and abdominal pain. West. J. Surg. **42:**146-152, 1934.
16. Heuer, G. J.: Anterior spinal nerve root section; surgical treatment of essential hypertension. Ann. Surg. **102:**1073-1076, 1935.
17. Crile, G., and Crile, G., Jr.: Blood pressure changes in essential hypertension after excision of the celiac ganglion and denervation of the aortic plexus. Cleveland Clin. Quart. **3:**268-277, 1936.
18. Adson, A. W., and Allen, E. V.: Essential hypertension: general considerations and report of results of treatment by extensive resection of sympathetic nerves and partial resection of both suprarenal glands. Proc. Inter-State Post-Grad. Med. Assem. North America, pp. 181-191, 1936.
19. Freyberg, R. H., and Peet, M. M.: The effect on the kidney of bilateral splanchnicectomy in patients with hypertension. J. Clin. Investigation **16:**49-65, 1937.
20. Allen, E. V., and Adson, A. W.: The physiological effects of extensive sympathectomy for essential hypertension. Am. Heart J. **14:**415-427, 1937.
21. Page, I. H., and Heuer, G. J.: The effect of splanchnic nerve resection on patients suffering from hypertension. Am. J. M. Sc. **193:**820-841, 1937.
22. Craig, W. McK.: Essential hypertension: the selection of cases and results obtained by subdiaphragmatic extensive sympathectomy. Surgery **4:**502-509, 1938.
23. Crile, G.: *The Surgical Treatment of Hypertension.* 239 pp. Philadelphia: W. B. Saunders Co., 1938.
24. Smithwick, R. H.: The value of sympathectomy in the treatment of vascular disease. New Eng. J. Med. **216:**141-150, 1937.
25. Schroeder, C. F., and Cumming, R. E.: Resection of superior hypogastric plexus and sacral sympathetic ganglions for the relief of pain in the bladder. J. A. M. A. **112:**390-396, 1939.
26. Cotte, M. G.: Sur le traitement des dysménorrhees rebelles par la sympathectomie hypogastrique périartérielle ou la section du nerf présacré. Lyon méd. **135:**153-159, 1925.
27. *Idem:* Resection of the presacral nerve in the treatment of obstinate dysmenorrhea. Am. J. Obst. & Gynec. **33:**1034-1040, 1937.
28. Meigs, J. V.: personal communication.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTEMORTEM AND POSTMORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT, M.D.

TRACY B. MALLORY, M.D., *Editor*

CASE 25111

PRESENTATION OF CASE

First Admission. A seventy-two-year-old married English farmer was admitted complaining of abdominal pain.

About six months before admission the patient began having attacks of cramp-like pain in the right lower quadrant which seemed to move slowly upward to the right upper quadrant. These attacks lasted about five minutes and occurred at one- to five-day intervals. They were always relieved by defecation or the passage of gas. During these six months he also had epigastric distress with a feeling of fullness accompanied by belching and sometimes regurgitation of sour material. This distress usually came on after breakfast and was somewhat relieved by taking soda. At times he had mild, non-radiating epigastric pain. Occasionally he also noted a "lump" in the right upper quadrant which would disappear after the pain had gone. On some occasions the pain was made worse by food and relieved by soda. There was no definite relation to meals or to the type of food eaten. During the past year he had been constipated whereas previously his bowel movements had been regular. At times during the last six months he had noticed dark stools and on a few occasions a small amount of bright-red blood. He stated that his appetite had been poor for a year but that until recently he had eaten about the same amount that he always had. He felt that he had lost a considerable amount of weight during the last six months, but had not actually weighed himself. Five days before entry he felt somewhat nauseated and vomited about a half cupful of bright-red blood. He had not vomited previously. Later the same day he vomited some very dark, thick fluid. During the next two days he vomited a similar material. There was no emesis during the last two days although he felt nauseated. He had not had severe right upper-quadrant pain, icterus or clay-colored stools. There had been no abdominal tenderness or swelling and no pain that awakened him at night. His past and family histories were noncontributory.

Physical examination showed an obese elderly man in no distress. Examination of the lungs was normal. The heart did not seem to be enlarged. There was a harsh systolic murmur loudest over the aortic area. A_2 was louder than P_2. The blood pressure was 148 systolic, 68 diastolic. The abdomen was soft and no masses or tenderness could be made out. By rectal examination the prostate was twice its normal size, but symmetrical and non-tender.

The temperature was 99°F., the pulse 100, respirations 24.

The urine examination was negative except for the presence of 10 to 15 white cells per high power field. The blood showed a red-cell count of 2,600,000 with 50 per cent hemoglobin, and a white-cell count of 7600 with 76 per cent polymorphonuclears. There was marked anisocytosis and many of the red cells were large, though all were well filled with hemoglobin. The volume index was 1, the color index 1. A blood Hinton test was negative. A bromsulfalein test of liver function showed 0 to 5 per cent retention. A Takata-Ara test was negative. Three gastric analyses showed free acid varying from 27 to 94 units, total acid from 67 to 100 units. One stool examination was guaiac positive, another guaiac negative.

A barium enema x-ray examination showed a large pressure defect for a distance of 20 to 25 cm. in the sigmoid, due to a large "tumor" in the pelvis, apparently a full bladder. The remainder of the examination of the colon was negative. A gastrointestinal x-ray series showed a normal esophagus and a high stomach but was otherwise negative. Hourly follow-up films of the small intestine showed no abnormality aside from pressure on the lower loops of ileum apparently due to a filled urinary bladder.

On the fifth hospital day a Graham test was negative. The following day a proctoscope was passed a distance of 21 cm. showing no obstruction. The rectal mucous membrane was granular and definitely pigmented. No cancer or ulcers were seen. During the next few days the patient felt well and his bowel movements were normal. He was discharged on the fourteenth hospital day.

Final Admission (six months later). Since discharge he had felt fairly well except for occasional mild attacks of epigastric burning sensations relieved by milk and crackers. He had had a few attacks of right upper-quadrant and epigastric pain associated with vomiting of small amounts of dark blood. These attacks passed off readily leaving only slight soreness in the epigastrium. Two days before admission he suddenly became nauseated about 9 p. m. and vomited, but there was no blood in the vomitus and he had no pain. From 10 p. m. to 4 a. m. he was unable to sleep because

of shaking chills and fever. At 4 a. m. he vomited approximately a pint of dark-brown material. At 5:30 a. m. he suddenly experienced a sharp pain beginning in his right side, extending across the right upper quadrant beneath the costal margin to the epigastrium. The pain lasted about five minutes, but soreness remained in this area. Similar attacks of pain recurred throughout the day and in the afternoon he vomited clots of blood. There had been no change in weight since the last admission.

Physical examination revealed a slightly pale man in no distress. There was no dyspnea or cyanosis. Examination of the lungs was normal. The heart sounds were normal in rate, rhythm and quality. The blood pressure was 120 systolic, 60 diastolic. The abdomen was soft, and peristalsis sluggish. An indefinite mass was present in the left lower quadrant which was tender just to the left of and below the umbilicus. Rectal examination revealed a symmetrically enlarged prostate.

The temperature was 98.6°F., pulse 80, respirations 20.

The urine examination was negative. The blood showed a red-cell count of 3,170,000 with 75 per cent hemoglobin and a white-cell count of 13,000 with 81 per cent polymorphonuclears. There was considerable variation in the size of the red cells. A blood Hinton test was negative. The nonprotein nitrogen of the serum was 59 mg. per cent. Four stool examinations were guaiac positive.

A barium enema examination showed that the sigmoid looped high out of the pelvis and remained fixed in that position. There was an impression that there was an extrinsic tumor posterior to the sigmoid in this area, although no definite tumor mass could be made out on the film. The remaining colon and cecum were normal.

On the third hospital day a gastrointestinal x-ray series showed a large amount of barium in the colon from the previous examination. The appendix was filled at this time. The hepatic flexure partially obscured the region of the duodenal cap. As far as could be told there was no evidence of abnormality in the stomach or duodenum. An intravenous pyelogram was negative. Four days later a repeat gastrointestinal series was essentially the same as the previous one. The stomach was high, the duodenum pointed posteriorly and was rather difficult to examine. On the seventh hospital day the temperature rose from normal to 102°F., and on the eighth day to 103°F. then returned to normal. Respirations remained at 20. On the eleventh hospital day a cystoscopic examination showed a normal bladder and no significant enlargement of the prostate. The following day gastroscopy showed a normal stomach. The pylorus was not seen. Two days later the temperature rose sharply to 103°F., respirations to 30. The right arm was swollen and hot. On the fifteenth hospital day the patient was moribund. There was dullness at the right lung base and numerous crackling rales. Rales were also present over the left base. An indefinite mass was palpated in the left lower quadrant, and pressure over this area caused pain. A blood culture showed hemolytic streptococci. The patient rapidly failed and died on the sixteenth hospital day.

Differential Diagnosis

Dr. F. Dennette Adams: The two admissions to the hospital will be discussed separately. At the first admission four important symptoms require explanation: (1) vomiting of blood, (2) pain, (3) increasing constipation, (4) loss of weight occurring in spite of a presumably adequate diet.

The pain is of the obstructive type. Its distribution is most suggestive of an obstructive lesion in the colon, a hypothesis which is further borne out by the fact that the patient was aware of a "lump" in the right upper quadrant which, along with the pain, would disappear following a bowel movement or passage of gas.

Hematemesis most commonly results from peptic ulcer, gastritis, esophageal varices, gastric polyp, or cancer. The history is not suggestive of peptic ulcer or gastritis, although either sometimes exists without characteristic pain related to food intake. Nor are there any symptoms to make one suspicious of cirrhosis of the liver with resultant esophageal varices. Gastric polyp might be a cause of the bleeding but would not explain pain of this character.

If then, we rely on history alone — that is all we are considering at this point — the most plausible explanation of the illness is cancer of the stomach. Increasing epigastric pain, loss of weight, hematemesis and increasing constipation are all readily explainable on this basis; involvement of the colon with partial obstruction could be due to extension of the tumor with invasion of the transverse colon.

Physical examination contributes very little. The harsh systolic murmur at the base may indicate calcareous disease of the aortic valve with some degree of stenosis, but the evidence is inconclusive. Nothing is said about a thrill, or diminution of the aortic second sound. The pulse pressure of 80 is decidedly against aortic stenosis; one of 20 or 30 would be more convincing. Absence of a palpable mass does not necessarily exclude cancer of the stomach, but one would hardly expect the patient to have a gastric cancer sufficiently extensive to involve the transverse colon

without its being palpable. The prostate is large but is not described as being hard or asymmetrical, which is the usual story with carcinoma of this gland.

The blood count is consistent with anemia secondary to hemorrhage, although one would expect a low volume index and low color index. The polymorphonuclear count is relatively high. The normal liver function and Takata-Ara tests are added evidence against cirrhosis of the liver. The high gastric acidity is definitely against cancer of the stomach and, taken into consideration with the negative x-ray, seems to exclude this disease.

It now becomes necessary to look elsewhere for a solution of this problem and when we seek help from the roentgenologist we are further confused by being forced to account for a mass in the lower abdomen in addition to the symptoms referable to the upper abdomen. The roentgenologist's observation that a mass is present is doubtless correct, but I question his interpretation for these reasons: (1) An acutely distended bladder should cause lower abdominal discomfort or pain and probably a story of inability to void. (2) A chronically distended bladder secondary to obstruction, or a diverticulum of the bladder would probably cause some urinary symptom such as frequency and certainly an infected urine. Neither is reported in this case. What, then, are the diagnostic possibilities? The lower abdominal mass, judging from the roentgenologic appearance, is not an intrinsic tumor, so we can exclude cancer and multiple polyps of the lower bowel. The latter are further excluded by the proctoscopic examination; for, when multiple polyps are present, one or more can usually be seen. There is nothing to suggest diverticulitis with abscess. Furthermore, none of these disorders can account for the hematemesis. I do not know the significance of the pigmentation and the granular appearance of the rectal mucosa. Pigmentation is sometimes due to prolonged use of cascara.

Perhaps Dr. Holmes will demonstrate the x-rays.

Dr. George W. Holmes: In a case of this kind with so many films it is almost impossible to give intelligent information on short notice. In the records there is no statement that anything very definite was found. This film shows an appearance in the sigmoid which is sometimes seen when gut is stretched over a mass, and I would agree with what has been said, that the mass lies outside the colon and that the colon may be adherent to it or stretched over it. We have no evidence that there was a mass in the small bowel, but it is well known that a large mass may be present without producing obstruction, and unless the examiner happens to make his observation at the time the barium is passing through the involved region it may be missed. Apparently that was thought of and a careful study done to rule out the small bowel, but nothing was found. I have not seen anything in this collection of films to lead me to believe that that observation was incorrect. His appendix is visible and well filled; it appears to be normal. I do not believe the mass was due to an abscess of the appendix or anything of that sort. He has a very wide duodenal loop, but there are no changes in the mucosa of the duodenum and no evidence of block, and a wide loop, particularly in a patient with a high stomach, is of no real significance although one might consider more carefully tumor in the head of the pancreas. The films of the urinary tract show the kidney outlines to be normal; the location is normal, and there is nothing unusual in the appearance of the kidney pelvis.

Dr. Adams: It seems to me we can best explain this confusing clinical picture by making a diagnosis of malignant lymphoma. An ulcerative lesion high in the small intestine could account for the hematemesis, especially if there is partial obstruction and, as we know, a lesion in the small intestine is often overlooked by the roentgenologist. The lower abdominal mass could well be enlarged lymph nodes, mesenteric or retroperitoneal. The relatively high polymorphonuclear count would also fit in with the diagnosis of lymphoma. And as far as I can see, there is nothing in the picture which might exclude such a diagnosis. If lymphoma involves the stomach, the gastric acidity is usually low rather than high. However, in this case, we do not suspect a lesion in the stomach. I do not know what degree of gastric acidity is common in cases of lymphoma involving that intestinal tract. Some less common form of tumor, such as leiomyoma, I suppose should be mentioned, but there is no evidence for or against it.

On second admission, the story of feeling fairly well except for occasional attacks of epigastric burning, relieved by milk and crackers, is especially characteristic of gastric or duodenal ulcer. One can conceive of its being consistent with an ulcerating lesion somewhat lower down. This and the high gastric acidity are the only bits of evidence which we have in favor of peptic ulcer. There is no report as to how the man was treated between his first and second admissions and I wonder if by any chance he was given radiation.

Dr. Tracy B. Mallory: I am sure he did not have radiation. He may have been on a gastric diet.

Dr. Adams: "He was unable to sleep because

of shaking chills and fever." Probably he did not have a true chill but only the chilly sensations which almost always accompany onset of fever.

There is nothing in the second admission to influence me to change my diagnosis. The gastroscopy ruled out even more completely cancer of the stomach, gastritis, and the less likely possibility of ulcer of the stomach. It could not rule out ulcer of the duodenum.

Why did the man die? The episode of chills, fever, and severe pain suggests perforation and of course, if he perforated something, it was undoubtedly the ulcerative lesion which we assume to be present. Perhaps the process was sufficiently walled off to prevent general peritonitis. Even so, he may have had general peritonitis for we know this condition can exist in debilitated patients without producing the usual picture. In this case it is unlikely because of the interval of time between the onset of the acute episode and death. Septicemia, secondary to perforation, embolic pneumonia, and an embolic lesion in the arm are the likely terminal features.

The most plausible explanation which I can give of this man's illness is that he had malignant lymphoma causing an ulcerative lesion of the upper part of the intestinal tract, perhaps the lower duodenum or the upper jejunum, and enlargement of abdominal lymph nodes, and that he died of septicemia secondary to perforation of the ulcerative lesion. Calcareous aortic disease may have been present but is of only secondary importance.

Dr. Mallory: On reading over the history as given to Dr. Adams I found myself quite unable to make a diagnosis and yet the autopsy permission was filled out with the correct diagnosis when it came over to us. I would be interested to know how they did it.

Dr. Ralph Adams: An explanation should be made. Everyone saw this patient from the senior surgeon of the hospital down to the house student. The only one who had not seen the patient, and incidentally the youngest man on the service, saw him at three o'clock in the morning when he was discharging him to your department, read the history, and was the only person who made a correct diagnosis.

Clinical Diagnoses

Malignant tumor of large intestine.
Pulmonary infarcts.
Bronchopneumonia.

Dr. Adams's Diagnoses

Malignant lymphoma with an ulcerative lesion of the upper part of the small intestine and involvement of abdominal lymph nodes.
General septicemia.
Septic bronchopneumonia.
Embolic infarct of the arm.

Anatomical Diagnoses

Duodenal ulcer, chronic.
Pulmonary atelectasis.
Melanosis coli.
Meningioma.
Basophilic adenoma of pituitary.

Pathological Discussion

Dr. Mallory: The autopsy showed only one lesion of any significance. That was a typical chronic duodenal ulcer. The terminal episode was septicemia undoubtedly from phlebitis in the arm. There was no mass anywhere in the lower abdomen. The prostate was not significantly enlarged; the bladder was perfectly normal. There was nothing in the lower intestinal tract.

A Physician: Was the phlebitis possibly secondary to therapy?

Dr. Ralph Adams: It so happened he had not had an intravenous in that arm. He had had one in the other arm.

Dr. Richard Schatzki: Did he have multiple pulmonary infarcts?

Dr. Mallory: No, foci of atelectasis and minimal bronchopneumonia.

Dr. F. Dennette Adams: Had he no perforation?

Dr. Mallory: No.

Dr. Adams: Dr. Mallory, what is the significance of the pigmentation of rectal mucosa noted on proctoscopic examination?

Dr. Mallory: It was characteristic melanosis coli. This is common in the seventies, very common in the eighties and, in my experience, universal in the nineties.

I should, perhaps, for the sake of completeness mention two other findings. There was a small meningioma of the dura, and microscopic sections of the pituitary show a small basophilic adenoma. Certainly neither of them produced overt clinical symptoms, but one might speculate on their etiologic relation to the ulcer.

CASE 25112

Presentation of Case

A fifty-year-old married Canadian carpenter was admitted complaining of lower abdominal cramps of ten days' duration.

The patient was entirely well until he noted the insidious onset of painless watery diarrhea five months prior to admission. This continued with a frequency of four to six movements per day, some occurring at night, without mucus, blood or pus. His appetite remained good and he had no nausea or distention. Twelve days before entry, without apparent precipitating cause, cramp-like lower abdominal pains began, recurred at intervals of a few minutes to three hours, day and night, and lasted until entry. They seemed to be somewhat aggravated by eating. The pain was of a spasmodic nature, "like something turning inside," not localized to a definite area. It began in the right lower quadrant, but during the first night moved into the epigastrium. During the last few days it had also involved the entire lower abdomen and the left flank. His diarrhea continued. There was no relief of pain after a bowel movement. He vomited only once, five days before admission, after taking "creamy" medicine ordered by his physician. A tender area developed just below the xiphoid in the midline. He had lost 15 pounds in weight during the last six months. He had not had chills or fever. No questionable food, water or milk had been ingested and no one with whom he was associated had a similar condition. His past and family histories were noncontributory.

Physical examination showed a dehydrated man having episodes of acute abdominal distress. Examination of the chest was negative. The blood pressure was 115 systolic, 65 diastolic. The abdomen was soft. There was a small tender area just beneath the xiphoid in the midline, apparently over the left lobe of the liver. There was no tenderness on percussion over the right costal margin. No organs or masses were palpable.

The temperature was 101°F., pulse 65, respirations 25.

The urine examination was negative. The blood showed a red-cell count of 3,700,000 with 70 per cent hemoglobin and a white-cell count of 12,200 with 78 per cent polymorphonuclears, 20 per cent lymphocytes, 2 per cent eosinophils. The red cells showed slight anisocytosis. The serum nonprotein nitrogen was 20 mg. per cent, the chlorides 101 milliequivalents. A van den Bergh test was normal, indirect. A bromsulfalein test of liver function showed 35 per cent retention of the dye. A Takata-Ara test was negative. Several blood cultures showed no growth. A stool examination was guaiac negative. A stool culture showed no pathogenic organisms. Typhoid and Paratyphoid A and B agglutination tests were negative. An undulant fever agglutination test was weakly positive in all dilutions from 1:40 to 1:1280.

A barium enema x-ray examination was negative.

On the third hospital day the patient's temperature had risen to 104°F. Tenderness in the epigastrium was more marked, and percussion over the right costal margin was quite painful. The pulse was only 80, despite the high temperature. The spleen was not palpable. There were no rose spots. A proctoscopic examination showed a slightly pale and edematous mucosa. There were no ulcers. An examination for amebae was negative. Two days later the liver remained tender, but the temperature was lower and the patient was symptomatically improved. On the seventh hospital day an x-ray of the chest showed a diaphragm unusually high on the right. The right lower-lung field showed decreased radiance apparently due to pressure atelectasis. Emetine hydrochloride therapy had been started on the third hospital day and given daily. On the ninth hospital day the temperature had returned to normal. On the following day a stool examination was guaiac positive. A gastrointestinal x-ray series taken on the fourteenth hospital day showed a lobulated mass occupying the upper half of the stomach. However, a re-examination was requested to rule out foreign material. Three days later a fixed, firm mass was palpated in the left epigastrium. The liver was enlarged and nodular, extending 4 cm. below the right costal margin. A repeat gastrointestinal x-ray series at this time showed a lobulated mass in the stomach.

Again it was not possible to demonstrate a definite attachment of this mass to the stomach wall. The mass seemed to lie slightly lower in position than on the previous examination. On the twenty-first hospital day the patient vomited yellow mucoid material which was guaiac negative. One day later he vomited 100 cc. of reddish fluid which was guaiac positive. Jaundice was noted at this time and a van den Bergh test was diphasic with 7.35 mg. per cent bilirubin. The liver continued to enlarge. On the twenty-third hospital day the upper border was at the fifth rib, the lower edge 8 cm. below the costal margin in the right midclavicular line. The patient continued to vomit reddish-brown, guaiac-positive material and the jaundice deepened. He rapidly failed and died on the thirty-second hospital day.

Differential Diagnosis

Dr. Richard Schatzki: The patient was, so far as I remember, sent to the X-ray Department merely to exclude the possibility that there was anything wrong with the stomach or duodenum.

Dr. Myles P. Baker: They evidently thought at the time that the emetine therapy had been a success; the fever was down.

Dr. Schatzki: I was surprised when I found this huge lobulated mass which was described in the record. It occupied the body of the stomach, like a bunch of big grapes. When you see such a mass in the stomach, particularly if it is lobulated, you like to see the stalk with which it is attached to the wall because that is the only possible way of differentiating a polypoid lobulated tumor and foreign material in the stomach. I was thinking of a case that had been discussed here recently in which I was not able to demonstrate such attachment. Because of the persistence of the shadow on several examinations I finally called it tumor, but it proved to be merely a blood clot. I therefore tried to demonstrate the attachment here and was not able to do so. In addition the mass moved within the stomach about 3 cm. up and down. Nevertheless, the appearance of the mass was much more characteristic of a lobulated tumor than it had been in the other case. I did not have much doubt about the case, but because of the preceding one I asked for a gastroscopy. Unfortunately the patient's condition did not permit this.

Dr. Baker: Is this mass in a position consistent with the physical finding of a firm mass in the left upper abdomen?

Dr. Schatzki: The position is consistent, but I would not expect this particular type of tumor to be very firm.

Dr. Baker: Does it appear definitely intrinsic?

Dr. Schatzki: Yes, a definitely lobulated mass within the stomach.

Dr. Baker: This is the story then of a man who for four or five months prior to hospital admission had a mild day-and-night diarrhea, watery movements of the sort that one finds in individuals who have an irritative lesion of the small intestine, as ileitis. There has been no tendency to alternating constipation and diarrhea. Prior to entry he developed acute colicky pain localized chiefly in the right lower quadrant. It is similar to that seen with mild, partial intestinal obstruction. As we read on we find this to be a case of diarrhea with negative barium enema, without evidence of inflammatory colitis or malignancy in the colon. It was evidently hoped that emetine would prove a specific therapy if the man had amebiasis, but, despite the subsidence of fever as the case progressed, it proved to be a false hope. Prior to the putting up of these x-ray films I thought of certain possibilities in diagnosis, but I can no longer believe that they are tenable. One of them in view of the positive bromsulfalein retention was the possibility that the man had portal cirrhosis with a primary carcinoma of the liver. The finding of intrinsic tumor in the stomach makes this unlikely. I thought possibly it was a tumor in the left lobe of the liver causing extrinsic pressure defect in the stomach.

I think that the bromsulfalein test here sticks out like a sore thumb because it indicates extensive intrahepatic disease. A marked dye retention of 35 per cent at the end of half an hour is a rare finding in metastatic malignancy in the liver. The negative Takata-Ara test is not consistent with any diffuse disease of the liver but is the rule with metastatic malignancy in the liver. Dr. Clark Heath reported positive Takata-Ara test in 60 per cent of cases of portal cirrhosis.* Dr. Neil L. Crone says that in this hospital all the cases of obvious decompensated portal cirrhosis have a positive Takata-Ara test, but only 75 per cent of so-called compensated portal cirrhosis have a positive test. One finds generally that the Takata-Ara test findings do not tally well with other tests of liver function. The negative Takata-Ara test here is consistent then with cirrhosis of the liver, without ascites, and is to be expected if he has metastatic malignancy in the liver.

Secondly, I considered the possibility that this man had carcinoma of the body of the pancreas developing as an epigastric mass above the lesser curvature of the stomach and causing pressure defect with marked metastasis to the liver. Carcinoma of the pancreas sometimes begins with diarrhea. On the whole we have very little evidence that there is such a disease, to judge from the x-ray findings. I believe cancer of the pancreas can involve the transverse colon. I suppose it is conceivable that it involves the stomach wall too, but that must be a very rare finding. A third possibility is lymphoma, producing irritative symptoms in the small intestine. His symptoms began with gradual decrease in strength, with attacks of colicky pain consistent with mild intestinal obstruction. Evidence of liver involvement developed from the laboratory examinations and eventually a tumor of the stomach was demonstrated. Lymphoma may diffusely infiltrate the liver in such fashion as to account for the evidence by laboratory test of diffuse intrahepatic disease. Cer-

*Heath, C. W.: The Takata-Ara test in the diagnosis of liver disease. New Eng. J. Med. 211:1077-1081, 1934.

tainly the fever, the anemia and the leukocytosis are consistent with such a diagnosis. Multiple areas of involvement of the bowel are rather characteristic of lymphoma and though there is no direct evidence of a lesion in the lower intestinal tract the symptoms certainly suggest one.

Is this primary adenocarcinoma of the stomach with metastasis to the liver? Were it such, I would expect the patient to have more definite stomach symptoms, with the accent on anorexia and active nausea rather than lower intestinal symptoms at the onset of the disease. It is an interesting combination of stomach mass and lower intestinal symptomatology. I think some such diffuse disease as lymphoma is the most tenable diagnosis.

DR. TRACY B. MALLORY: Dr. Schatzki, how would you feel about the possibility of the stomach tumor being lymphomatous?

DR. SCHATZKI: I do not think I have ever seen lymphoma produce such a lobulated polypoid type of lesion. If this is tumor it must have a comparatively small attachment and the main mass is polypoid. From my own experience it is very unlikely to be lymphoma. I would from the x-ray appearance clearly rule out lymphoma.

DR. MALLORY: How would you feel about it, Dr. Benedict?

DR. EDWARD B. BENEDICT: I did not see this patient and did not gastroscope him, but I was wondering if he could have had multiple polypoid lesions of the stomach as well as of the colon.

DR. BAKER: The barium enema was negative.

DR. BENEDICT: I cannot make a diagnosis.

CLINICAL DIAGNOSIS

Carcinoma of the stomach with metastasis to liver.

DR. BAKER'S DIAGNOSIS

Lymphoma of stomach, liver and small intestine.

ANATOMICAL DIAGNOSES

Polyposis of stomach with malignant degeneration.

Metastatic carcinoma to the liver.

Icterus.

Bilateral healed apical tuberculosis.

PATHOLOGICAL DISCUSSION

DR. MALLORY: This case is like the preceding one in that the clinical symptoms seem to point to the lower intestinal tract, but the findings are all in the upper intestinal tract. The stomach showed about five polypoid lesions of which one was frankly malignant, two frankly benign and two questionable. The liver was very extensively involved with metastases, weighed 4500 gm. and three quarters of that weight was, I am sure, due to metastatic carcinoma. It is quite true that we very rarely see evidence of liver insufficiency with metastatic cancer, but in this case it was present. There was a great deal of necrosis of liver cells around the tumor nodules apparently from pressure or perhaps from interference with the blood supply that may have had something to do with the clinical evidence of liver insufficiency.

A PHYSICIAN: Was the spleen enlarged?

DR. MALLORY: The spleen was normal. The lower intestinal tract was absolutely normal, nothing whatever was found to account for the diarrhea except the stomach and the liver involvement.

The New England
Journal of Medicine
Formerly the
Boston Medical and Surgical Journal
Established in 1828

Owned by the Massachusetts Medical Society and Published under the Jurisdiction of the Committee on Publications

Official Organ of
The Massachusetts Medical Society
The New Hampshire Medical Society
The Vermont State Medical Society

Editorial Board

George G. Smith, M.D.	Dwight O'Hara, M.D.
Joseph Garland, M.D.	John P. Sutherland, M.D.
William B. Breed, M.D.	Stephen Rushmore, M.D.
George R. Minot, M.D.	Hans Zinsser, M.D.
Frank H. Lahey, M.D.	Henry R. Viets, M.D.
Shields Warren, M.D.	Robert M. Green, M.D.
George L. Tobey, Jr., M.D.	Charles C. Lund, M.D.
C. Guy Lane, M.D.	John F. Fulton, M.D.
William A. Rogers, M.D.	A. Warren Stearns, M.D.

Associate Editors

Thomas H. Lanman, M.D. Donald Munro, M.D.
Henry Jackson, Jr., M.D.

Walter P. Bowers, M.D., Editor Emeritus
Robert N. Nye, M.D., Managing Editor
Clara D. Davies, Assistant Editor

Subscription Terms: $6.00 per year in advance, postage paid, for the United States; Canada, $7.04 per year; $8.52 per year for all foreign countries belonging to the Postal Union.

Material for early publication should be received not later than noon on Saturday.

The Journal does not hold itself responsible for statements made by any contributor.

Communications should be addressed to the New England Journal of Medicine, 8 Fenway, Boston, Mass.

A MEDICAL HISTORIAN LOOKS AT SOCIALIZED MEDICINE

It is not easy in these times for anyone even to try to investigate certain aspects of socialized medicine. The very fact that a physician makes an effort to collect data from the Soviet Union and other places puts him, in the minds of many of his colleagues, far to the left and even attaches to him a red tag. Because of this, great credit should be given to any individual who has the courage to investigate Soviet medical practices thoroughly, although the fact that his passport carries a Russian visa gives him, to some more narrow-minded individuals, a distinct stamp of disapproval. Whatever may be the individual's feeling about the matter, one cannot ignore the fact that the socialization of medicine is already largely accomplished in certain countries and that steps in that direction are discernible even in democratic countries such as ours. One hears so much against socialized medicine that it is rather refreshing to find a medical historian looking at the subject, as a historian should, from an impartial point of view. Unquestionably the world's leader in the history of medicine at the present time is Dr. Henry E. Sigerist, the head of the Johns Hopkins Institute of the History of Medicine. He, as is well known, has made a thorough study of the socialistic trends in medicine in the last few years, and the facts which he presents must be given great weight, if the problem is to be met fairly by American physicians.

Fortunately, due to the energy of the weekly news magazine *Time*, a summary of the views for socialized medicine, as brought out by Dr. Sigerist, is published in the issue of January 30, 1939. Briefly, the seven points made in his argument are:

(1) State control of medicine is not a radical departure, for more than 60 per cent of all hospital beds in this country are owned and operated by governmental agencies. A large part of the care of patients with tuberculosis, blindness, leprosy and narcotic addiction falls under the direction of physicians paid by the United States Public Health Service.

(2) The opinion is expressed that to finance a system of state medicine in the United States would be neither difficult nor extravagant. A considerable portion of the money now spent in a haphazard and wasteful manner by the people might be saved if a scheme of care at least partly under government control was inaugurated. The indigent, under such a plan, would receive complete medical care without cost; low-income groups would be financed through compulsory health insurance; while the higher income groups could take care of their health in any way that they pleased.

(3) It is pointed out that although the argument is often used that salaried doctors lose their incentive to do good work, physicians such as Koch, Pasteur, Gorgas, Reed and Welch were all salaried men. So are the workers in the Mayo Clinic and the Rockefeller Institute for Medical Research and about 15 per cent of the United States doctors working in institutional hospitals.

(4) Socialized medicine would limit the free choice of a physician, but it is pointed out that few have a free choice today. A considerable percentage of the population attend clinics and hospitals without knowing which doctor is to see them. There are also many private clinics operating in part in the same manner.

(5) It is pointed out that socialized medicine would not spoil the personal relation between a patient and a

physician. The fact that a doctor is a member of an organized group does not spoil this relation. What really spoils it is that the doctor has to charge a fee and the patient has to pay the bill. Once the money question is removed, the relation between physician and patient becomes purely human.

(6) Socialized medicine need not lower the standard of medical care. There is no reason, as a matter of fact, why care should not be better under group practice, such as is exemplified by the outpatient departments of ordinary hospitals.

(7) Finally, there is the question of whether government control would bring politics into medicine. It should be pointed out that the United States Public Health Service, one of the most efficient in the world, has always been free from politics. It seems reasonable to assume, moreover, that any matter dealing so intimately with the public as the question of their health would develop behind it a strong enough public opinion to overcome meddling by politicians.

These are the arguments that are used for socialized medicine. Whether such a scheme could actually be put into practice, is another question, of which Dr. Sigerist is not unmindful. In order to study the condition historically he will ask his students to investigate certain parts of the State of Maryland with the idea of outlining a plan to put into practice socialized medicine, guaranteeing to give to every individual the best possible medical care. By methods such as this a question which is vexing the whole medical world may be solved. At least if we do not look at the problem from all sides, we are sure to let our judgment be swayed by emotions rather than by our intellect. *Time* has done a distinct service to the medical profession in presenting Dr. Sigerist's view in a clear-cut and interesting manner. It is hoped that its editors, in turn, will interview an exponent of the opposite theories and present the arguments against socialized medicine in a manner of equal impartiality.

THE ADAPTABILITY OF THE HUMAN MIND

In the early years of the depression a nationally known labor leader issued a statement to the effect that if economic security was not speedily restored, chaos would result; men could not stand the pressure of opposing circumstances; their minds would give way and they would go mad. Men's minds did, of course, give way in those days, and men did go mad, just as they have, and will, in every known year and under all conceivable circumstances. The mass of men, however, shifted their pace to suit the rate of travel and continued on their way.

We adapted ourselves in 1914 and 1915, and particularly in 1917, to the idea of a world war, and did it with surprising alacrity and thoroughness. It is useless to go back through history to see how often and under what conditions man has adapted himself to changing environmental influences; history, in our minds, is a dead record of things that cannot happen again.

The prewar era, it is true, represented a rather long and rather static period. Capitalism and the upper middle classes were firmly entrenched in a pious position of not positively unfriendly domination. Labor was allowed a full dinner pail, the country had a fairly good five-cent cigar, and there was nothing to go mad about unless the wrong team won the pennant.

What a change was wrought in 1914! First came a world war with a pandemic of disease, then a minor depression, a period of unprecedented prosperity, — and this was the hardest on men's minds, — a great depression, several pseudo recoveries, floods, hurricanes and tidal waves in New England, — of all places, — a shift to the left in our country's politics, again the tread of armed feet over Europe, the British lion with his tail between his legs, a definitely threatened yellow dominancy, and War Admiral again beaten by Sea Biscuit.

Dare we predict that if the worst happens, — if socialized medicine strikes at the very tap root of family practice, — if white dominancy and the civilization that started with the Renaissance go down to glory in a blaze of gunfire, when the smoke clears, those of us who are left will be found with our noses pressed against the window-pane, trying to get the latest baseball scores, or lined up before the totalizer to find our winnings when Plum Pudding beats Humble Pie by a length?

MASSACHUSETTS MEDICAL SOCIETY

SECTION OF OBSTETRICS AND GYNECOLOGY*

RAYMOND S. TITUS, M.D., *Secretary*
330 Dartmouth Street
Boston

POSTPARTUM HEMORRHAGE DUE TO A PARTIALLY ADHERENT PLACENTA

Mrs. R. F., a thirty-two-year-old para III, at term, entered the hospital in active labor on November 20, 1937.

The family history was essentially negative, as was the patient's past history. Catamenia began at thirteen, were regular with a twenty-eight-day cycle and lasted four days without pain. Her two previous pregnancies had been normal and resulted in normal deliveries. Her last period was said to be December 25, 1936, making her due for delivery October 1, 1937, but it was assumed that her dates were confused. The present pregnancy had been normal throughout.

Physical examination at entry showed a well-developed and well-nourished woman. Her heart was not enlarged; there were no murmurs. Her lungs were clear and resonant; there were no rales. The blood pressure was 114 systolic, 64 diastolic. The fundus was three fingers below the ensiform, with the vertex in the LOA position and engaged. The fetal heart was heard at the rate of 140 in the left lower quadrant. Her pelvic measurements were normal.

Her labor was short and active, without benefit of any medication. She was delivered normally of a 7 pound, 12 ounce, female child at the end of four hours. One ampule of posterior pituitary extract was administered at the end of the second stage of labor. At this time the pulse rate was 104. The fundus did not react well, the placenta did not separate entirely, and she bled steadily and moderately. She was therefore etherized, and a manual extraction of the placenta was performed without difficulty one hour after the birth of the baby. Following this, the patient went into a state of shock with a pulse of 144. Intravenous glucose was attempted, but the veins were collapsed. A vein was cut down upon, and 2000 cc. of 5 per cent glucose was administered. At the end of this time her blood pressure was 100 systolic, 44 diastolic. The uterus seemed to be in good condition, and it was believed that the patient was out of danger. Additional pituitary extract and an ampule of Ergotrate had been given before and after the extraction of the placenta.

Within an hour the patient had again lapsed into shock, with a blood pressure of 80 systolic, 56 diastolic, and a pulse at the rate of 168, which was weak and irregular. The fundus was soft and enlarged, and the patient bleeding. Accordingly the uterus and vagina were tightly packed. This effectively controlled the hemorrhage. Another intravenous injection of glucose was given. The pulse rate was 190 and almost impossible to obtain. The blood pressure was 60 systolic, 50 diastolic, and caffeine and Coramine were given. As suitable donors had been procured, a citrate transfusion of 600 cc. of blood was given. The pulse came down to 120 and was regular but thready. An hour after the first transfusion 500 cc. of additional blood was administered. The pulse rate was then 114, the blood pressure 110 systolic, 70 diastolic, and although she was weak and pale, she was out of shock, with a pulse of fair quality and no bleeding.

For the next twenty-four hours, she had a pulse rate of about 140, and the blood pressure was 130 systolic, 60 diastolic. During this time she received 2000 cc. of 10 per cent glucose in distilled water; it was allowed to run in over a period of eight hours. The uterine pack was removed at the end of this time. Her fundus remained firm, and there was no more bleeding. She ran a septic course for a week and was discharged on the twenty-second day. Her red-blood-cell count was 3,750,000 and the hemoglobin 75 per cent on the seventeenth day.

Comment. This case of postpartum hemorrhage was due to a partially adherent placenta and emphasizes the need of carefully watching every fundus after the placenta has been delivered, especially one in which postpartum hemorrhage has occurred. It is doubtful whether this fundus was carefully watched after the placenta was removed. It is also possible that the packing of the uterus at the beginning might have prevented the secondary hemorrhage. Intravenous pituitary extract was not used; it might have been valuable.

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section.

CHAPTER 112, SECTION 8, OF THE GENERAL LAWS OF MASSACHUSETTS

At the request of a fellow of the Massachusetts Medical Society, we are reprinting Chapter 112, Section 8, of the General Laws of Massachusetts.

> No person shall enter upon, or continue in, the practice of medicine within the commonwealth until he has presented to the clerk of the town where he has, or intends to have, an office or his usual place of business, his certificate of registration as a physician in the commonwealth, or, if it is lost, a certified state-

ment issued by the board, setting forth all the material facts in the original certificate, and a fee of twenty-five cents. Thereupon the clerk shall record the name of the owner of said certificate or certified statement, together with the date of record, upon blanks approved by the board, said blanks to be so arranged that a duplicate carbon copy shall be made at the time of the original record. He shall keep the original as a part of his official records and it shall be open to public inspection. He shall, within twenty-four hours after such recording, forward the duplicate to the board. Whoever practices or attempts to practice medicine without complying with this section, or whoever submits to a town clerk a false or fraudulent certificate or certified statement, shall be punished by a fine of not less than five nor more than one hundred dollars; and any town clerk who refuses or neglects to comply with this section shall be punished by a fine of not less than five nor more than ten dollars.

LEGISLATIVE NOTES

Massachusetts Medical Society Ballot of March 2, 1939

COUNTED THROUGH MARCH 13 MORNING MAIL

Table 1. *Vote on Annual Registration by District Medical Societies.*

DISTRICT	FAVOR	OPPOSE	BLANK
Barnstable	18	9	0
Berkshire	50	18	0
Bristol North	18	20	0
Bristol South	64	48	3
Essex North	53	55	4
Essex South	92	51	3
Franklin	10	14	1
Hampden	131	53	2
Hampshire	33	23	0
Middlesex East	13	51	2
Middlesex North	63	27	3
Middlesex South	320	180	5
Norfolk	281	202	5
Norfolk South	32	30	1
Plymouth	69	33	4
Suffolk	303	150	15
Worcester	135	114	8
Worcester North	38	30	0
Out of State	93	30	3
	1816	1138	59
Total			3013

Table 2. *Vote on Annual Registration in 11 Largest Communities.*

CITIES AND TOWNS	FAVOR	OPPOSE	BLANK	TOTAL
Boston	290	210	17	517
Brookline	165	60	1	226
Newton	120	47	0	167
Worcester	89	74	0	163
Springfield	91	31	1	123
Cambridge	68	27	1	96
Lowell	52	17	1	70
Lawrence	23	26	2	51
Lynn	31	19	1	51
New Bedford	31	18	2	51
Fall River	21	21	1	43

In this table votes were classified, as nearly as possible, according to *residence* and not according to district society memberships.

Table 3. *Vote on Osteopathic Bills.*

	FAVOR	OPPOSE	BLANK
H. 985	13	2951	51
H. 986	55	2903	57

MEDICAL POSTGRADUATE EXTENSION COURSES

The following sessions, given by the Massachusetts Medical Society in co-operation with the Massachusetts Department of Public Health, the United States Public Health Service and the Federal Children's Bureau, have been arranged for the week beginning March 20:

BARNSTABLE

Sunday, March 26, at 4:00 p. m., at the Cape Cod Hospital, Hyannis. Subject — Gonorrhea: Modern treatment of gonorrhea. Instructor: Samuel N. Vose. Donald E. Higgins, *Chairman.*

BERKSHIRE

Thursday, March 23, at 4:30 p. m., at the House of Mercy Hospital, Pittsfield. Subject — Sepsis. Instructor: Joseph W. O'Connor. Melvin H. Walker, Jr., *Chairman.*

BRISTOL NORTH

Thursday, March 23, at 4:00 p. m., at the Morton Hospital, Taunton. Subject — Syphilis: Latent syphilis — diagnosis and treatment. Instructor: C. Guy Lane. Lester E. Butler, *Chairman.*

BRISTOL SOUTH (Fall River Section)

Tuesday, March 21, at 4:00 p. m., at the Union Hospital, Fall River. Subject — Heart Disease: The treatment of "heart attacks" or "cardiovascular emergencies." Instructor: Ashton Graybiel. Howard P. Sawyer, *Chairman.*

FRANKLIN

Wednesday, March 22, at 8:00 p. m., at the Franklin County Public Hospital, Greenfield. Subject — Whooping Cough: The present status of vaccine therapy both as prophylactic and therapeutic measure, the early diagnosis by laboratory procedures, and the treatment of complications. Instructor: Edwin H. Place. Halbert G. Stetson, *Chairman.*

HAMPDEN

Thursday, March 23, at 4:00 p. m., at the Academy of Medicine, Professional Building, 20 Maple Street, Springfield, and at 8:00 p. m., in the Outpatient Department of the Skinner Clinic, Holyoke Hospital, Holyoke. Subject — Gonorrhea: Modern treatment of gonorrhea. Instructor: Oscar F. Cox, Jr. George L. Schadt, *Chairman.*

MIDDLESEX EAST

Tuesday, March 21, at 4:00 p. m., at the Melrose Hospital (Colby Hall), Melrose. Subject — Anemia: Modern methods in diagnosis and treatment of blood dyscrasias. Instructor: Clark W. Heath. Walter H. Flanders, *Chairman.*

MIDDLESEX NORTH

Thursday, March 23, at 4:30 p. m., at St. John's Hospital, Lowell. Subject — Bright's Disease and Hypertension: Evaluation of new therapy; diagnosis. Instructor: W. Richard Ohler. William S. Lawler, *Chairman.*

MIDDLESEX SOUTH

Tuesday, March 21, at 5:00 p. m., at the Cambridge Hospital, 330 Mt. Auburn Street, Cambridge. Subject — Heart Disease: The treatment of

"heart attacks" or "cardiovascular emergencies." Instructor: Edward F. Bland. Alexander A. Levi, *Chairman.*

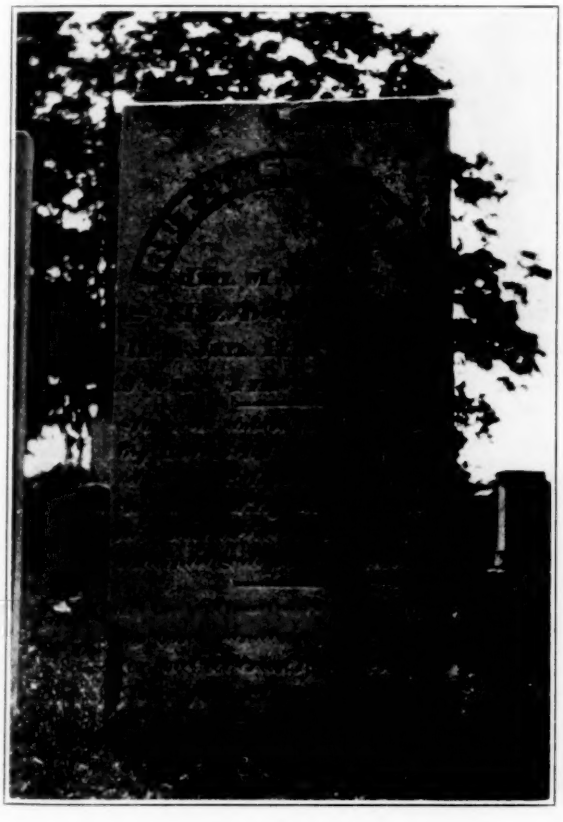
SUFFOLK

Thursday, March 23, at 4:30 p. m., in John Ware Hall, Boston Medical Library, 8 Fenway, Boston. Subject — Cardiovascular Emergencies. Instructor: Paul D. White. Reginald Fitz, *Chairman.*

CORRESPONDENCE

BODY-SNATCHING

To the Editor: In Hoosick Falls, N. Y., there is a historic gravestone with a censorious inscription which should interest the readers of Dr. Waite's article on the body-snatching activities of our old-time anatomists. Because of the weathering of the stone, the inscription is less distinct than it was when I first saw it, ten years ago. Nevertheless, the cold marble has distinctly reprobated the overzealous Dr. P. M. Armstrong for more than a hundred and twenty years.



In the case of the Ipswich exhumations, the parish meeting appointed "a day for the solemn reintering" of the eight empty coffins in "some conspicuous part of the graveyard," and voted "that a monument be erected over them by subscription, with the names of the deceased whose bodies were stolen inscribed thereon, to perpetuate the memory of the horrid deed." But, for lack of funds no such monument was erected. The outraged parents attended to the vindictive publicity in the Hoosick Falls case, and derogated *id omne genus* in the epitaph's last caustic line.

Here is the inscription:

RUTH SPRAGUE.
dau. of Gibson
& Elizabeth Sprague,
died Jan. 11, 1846; aged
9 years 4 mo's & 3 days.

She was stolen from the grave
by Roderick R. Clow & dissected at Dr. P. M. Armstrong's office
in Hoosick N. Y. from which place
her mutilated remains were
obtained & deposited here.

Her body dissected by fiendish Men
Her bones anatomised,
Her soul we trust has risen to God,
Where few Physicians rise.

We hope that there is less truth than poetry in the last line.

Far from these diggings, in Edinburgh, the body-snatching industry enriched the language by contributing the verb "to burke." This word is used more across the water than here. In the House of Commons, the Ministers are often accused of "burking a bill" in some committee.

The following *cause célèbre* produced the verb. A friendless old army pensioner died in a cheap lodging-house in Edinburgh. The lodging-house keeper, William Hare, sold the unclaimed body without difficulty to Dr. Robert Knox for 7 pounds, 10 shillings.

This profitable transaction furnished the idea for a new cottage industry. William Burke became Hare's accomplice in the hospitable practice of inveigling a series of obscure, friendless travelers to the lodging-house, where they made them drunk. Then they suffocated them tenderly, so that there would be no marks of violence. The same Dr. Knox bought all the proffered bodies at factory prices, varying from 8 to 14 pounds. After sixteen bodies were delivered to science, the police became suspicious and effective. Hare turned King's evidence, and Burke was hanged at Edinburgh, on January 28, 1829. An excellent account of the case is given in *Burke and Hare* (Edinburgh and London: William Hodge and Company, Ltd., 1921).

Soon thereafter, the word "burke" was used to indicate any quiet and decorous smotherings, where the *corpus delicti* disappeared without trace (*spurlos versenkt*). Dickens used the word in *Pickwick Papers:*

"You don't mean to say he was 'burked,' Sam?"

Let us hope that all bad medical bills will be burked in committee.

EDWARD F. TIMMINS, M.D.

527 Broadway,
South Boston.

DR. WILLIAM GAMAGE

To the Editor: The following account of a remarkable man is from S. F. Batchelder's *Bits of Harvard History* (Cambridge: Harvard University Press, 1924). Under the title of "Harvard Hospital-Surgeons of 1775" we find the following: "Dr. William Gamage of the class of 1767 was the regular Cambridge practitioner. He was an allopath of the allopaths."

Batchelder quotes from the late Dr. A. P. Peabody's account of Gamage in *Harvard Graduates Whom I Have Known* (Boston: Houghton-Mifflin Co., 1890), after telling us that Dr. Peabody, in his youth, knew the old gentleman. "His lavish over-medication," says Peabody, "gained for him unbounded popularity with the many who used a quantitative standard in estimating a physician's skill, and left traditions transcending easy belief in the succeeding generation."

"This style of treatment," Batchelder adds, "was encouraged by the custom in vogue whereby a doctor charged, not for his visits, but for the medicine he supplied. Gamage's bill to The Colony of Massachusetts Bay — 'From the 19th of April to 17th of August, 1775' — is still preserved, and is of unique interest as the earliest known document of its kind in the medical history of the Revolution. . . . According to custom, he makes no charge for 'Attending Upon The Sick And Wounded In The Provincial Army, And Upon The Wounded Regulars,' but for 'Medicine Advanced For The Wounded Regulars, In April, 1775' sets down items totalling 15s. 7d, and for 'Medicine Advanced For The Provincial Army In April And May, 1775' makes a footing of 14s 8d. . . . The 17th of August probably marks the date when he ceased to prescribe as a semi-independent civilian, and became a regular hospital mate, as noted hereafter. He did not follow the army when it left Cambridge, but continued his undisputed sway as the medical autocrat of the town until his death in 1821."

"Gamage," continues Batchelder, "was a character worthy of the pen of Cervantes or Molière and left behind him a deeper impression than any other physician of his time. In his last years his personality was indelibly stamped upon the childish memories of both the Holmes brothers. Oliver Wendell Holmes delineates him thus: 'Grim, taciturn, rough in aspect, his visits to the household were the nightmares of the nursery. He would look at the tongue, feel the pulse, and shake from one of his phials a horrible mound of powdered ipecac, or a revolting heap of rhubarb — good stirring remedies that meant business, but left a flavor behind them which embittered the recollections of childhood. This was the kind of practice many patients preferred in those days, they liked to know they had taken something energetic and active, of which fact they were soon satisfied after one of Dr. Gamage's prescriptions.'"

We are told that John Holmes "puts his reminiscences into the mouth of his 'Cambridge Robinson Crusoe.' . . . 'Oh, Dr. Gamage! He and his old yellow mare's about as tough as anything in Cambridge. What a pair they be! She is rhubarb color and his old surtout is just the color of ipecac. Oh, don't he give a feller the stuff! It's just like letting a cat down into a feller's stomach and pulling her out by the tail. I do declare, Captain, fur off as I am, it gives me a sort of a twist inside when I think of it.'" Batchelder adds that John Holmes's imitation of Gamage making a professional call was something never to be forgotten by the few who were privileged to behold it.

Batchelder states that the late Dr. H. P. Walcott supplied him with the following example of the doctor's methods: "Miss Eliza Ware, who lived as a child in the old Waterhouse cottage, remembered Gamage well. He used to wear an enormous waistcoat reaching almost to his knees, with some twenty small pockets, each containing a different drug in powdered form. On one occasion she had a fever. Dr. Gamage was summoned, and after a brief examination growled, 'Better have a little jalap.' He fumbled in a certain pocket, brought out a pinch of jalap, called for a glass of water, dropped in the nauseous purge, stirred it with an abominably dirty forefinger, and ordered 'Now, little girl, drink this!'" It is to be hoped that when the good doctor had occasion to renew his waistcoat charges he put them all in the right pockets!

Wm. Pearce Coues, M.D.

12 Monmouth Court,
Brookline.

NOTICES

MEDICAL CLINIC AT THE PETER BENT BRIGHAM HOSPITAL

At 3:30 p. m. on Thursday, March 23, in the amphitheater of the Peter Bent Brigham Hospital, Dr. James P. O'Hare will give a medical clinic. Practitioners and medical students are cordially invited to attend.

BOSTON DOCTORS' SYMPHONY ORCHESTRA

Rehearsals of the newly organized Boston Doctors' Symphony Orchestra, conducted by Nicolas Slonimsky, are held every Thursday evening at 7:30 at Hampton Court Hotel, 1223 Beacon Street, Brookline.

Membership is still open. All physicians, dentists and medical and dental students who are interested should communicate with Dr. Julius Loman, Pelham Hall Hotel, Brookline (BEA 2430).

BOSTON MEDICAL HISTORY CLUB

A meeting of the Boston Medical History Club will be held at the Boston Medical Library, 8 Fenway, Boston, on Monday evening, March 20, at 8:15.

Dr. A. Warren Stearns will talk on "Something Wrong with the Guts."

Members of the medical profession and other interested persons are cordially invited to attend.

Paul D. White, M.D., *President,*
Benjamin Spector, M.D., *Secretary.*

CARNEY HOSPITAL

The monthly clinical meeting and luncheon of the Carney Hospital will be held in Andrew Carney Assembly Hall on Monday, March 20, at 11:30 a. m.

PROGRAM

Conservative Versus Radical Treatment of Acute Biliary Disease. Dr. Laurence J. Louis.

Sulfapyridine (M & B 693) in Pneumonia. Dr. John F. Casey.

Unrecognized Pathological Conditions in Muscles. Dr. Matthew V. Norton.

Some Aspects of Bleeding in Pregnancy. Dr. Cornelius T. O'Connor.

Physicians and medical students are cordially invited to attend.

Roy J. Heffernan, M.D., *Secretary.*

NORFOLK DISTRICT MEDICAL SOCIETY

The next meeting of the Norfolk District Medical Society will be held in the Children's Pavilion of the New England Hospital for Women and Children, Dimock Street, Roxbury, on Tuesday evening, March 28, at 8:30. Tel. GAR 0912.

PROGRAM

Early Treatment of Club Feet. Dr. Miriam Katzeff.

Case Study of Complete Transposition of the Great Vessels. Dr. Bianca Lia.

Demonstration of Congenital Hearts from the Obstetric Service. Dr. Olga Leary.

Presentation of a Urological Case. Dr. Susannah Friedman.

A Ten-Year Study of Cesarean Section. Dr. Marjorie Woodman.

FRANK S. CRUICKSHANK, M.D., *Secretary.*

NEW ENGLAND HEART ASSOCIATION

The next meeting of the New England Heart Association will be held at the Beth Israel Hospital on Monday evening, March 27, at 8:15.

PROGRAM

The Significance of Variations in the Anatomy of the Coronary Arteries. Dr. Monroe J. Schlesinger.

The Circulatory Effects of Benzedrine and Paredrine and Their Clinical Significance. Dr. Mark Altschule.

The Incidence of Normal Cardiac Findings Following Acute Rheumatic Fever. Dr. Morton G. Brown.

The Significance of Changes in Blood Volume in Congestive Failure during Stages of Development and Recovery. Dr. John Waller.

Relation of Arterial Hypertension to Coronary Arteriosclerosis and to Congestive Failure. Dr. David Davis.

The Rate of Interchange of Substances between Plasma and Edematous Deposits. Dr. Dorothy Rourke Gilligan.

A Study of Marked Arteriosclerosis in Patients with and without Angina Pectoris. Dr. Herrman L. Blumgart.

Interested physicians and medical students are cordially invited to attend.

EDWARD F. BLAND, M.D., *Secretary.*

TUFTS COLLEGE MEDICAL SCHOOL ALUMNI ASSOCIATION

The annual meeting and dinner of the Tufts College Medical School Alumni Association will be held Wednesday evening, March 29, at the Hotel Somerset, Boston.

Changes in the medical school and progress of the medical school campaign will be discussed by President Leonard Carmichael.

ALONZO K. PAINE, M.D., *President.*

CAMBRIDGE HOSPITAL

The regular clinicopathological meeting of the staff of the Cambridge Hospital will be held at the hospital, 330 Mt. Auburn Street, Cambridge, on Tuesday, March 21, at 8:30 p. m.

Interesting pathological cases will be discussed.

All members of the medical staff are cordially invited.

STEPHEN M. BIDDLE, M.D., *Secretary.*

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING MONDAY, MARCH 20

MONDAY, MARCH 20

*11:30 a. m. Carney Hospital, clinical meeting and luncheon.
8:15 p. m. Boston Medical History Club. Boston Medical Library.

TUESDAY, MARCH 21

*9-10 a. m. Joseph H. Pratt Diagnostic Hospital. Clinicopathological Conference. Dr. Harold Wood. Discusser, Dr. Howard Sprague.

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

*12 m. South End Medical Club. Headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston.

*8:30 p. m. Cambridge Hospital. Clinicopathological meeting of the staff.

WEDNESDAY, MARCH 22

*9-10 a. m. Joseph H. Pratt Diagnostic Hospital. Hospital case presentation. Dr. S. J. Thannhauser.

*12 m. Clinicopathological conference. Children's Hospital amphitheater.

THURSDAY, MARCH 23

8:30-9:30 a. m. Exchange visit, Surgical and Orthopedic Staffs of the Peter Bent Brigham and Children's hospitals, held this week at the Children's Hospital Orthopedic.

*9-10 a. m. Joseph H. Pratt Diagnostic Hospital. Certain Aspects of Toxemias of Pregnancy. Dr. Lewis Dexter.

*3:30 p. m. Medical clinic at the Peter Bent Brigham Hospital.

FRIDAY, MARCH 24

*9-10 a. m. Joseph H. Pratt Diagnostic Hospital. Postoperative Shock and Allied Conditions. Dr. E. D. Churchill.

*10 a. m. - 12:30 p. m. Tumor clinic. Boston Dispensary.

SATURDAY, MARCH 25

*9-10 a. m. Joseph H. Pratt Diagnostic Hospital. Hospital case presentation. Dr. S. J. Thannhauser.

*10 a. m. - 12 m. Staff rounds of the Peter Bent Brigham Hospital. Conducted by Dr. Henry A. Christian.

SUNDAY, MARCH 26

4 p. m. Illustrated, public, health lecture, Faulkner Hospital auditorium. Foreign Bodies in the Upper Food and Air Passages. Dr. Lyman G. Richards.

*Open to the medical profession.

MARCH 17 — Sir William Osler Honorary Society of the Tufts College Medical School. Page 457, issue of March 9.

MARCH 19 — Health Lecture, Quincy City Hospital. Page 363, issue of February 23.

MARCH 19 — Lecture at the Faulkner Hospital. Page 971, issue of December 15.

MARCH 19 — Free Public Lecture, Harvard Medical School. Page 1056, issue of December 29.

MARCH 20 — Carney Hospital. Clinical meeting and luncheon. Page 492.

MARCH 20 — Boston Medical History Club. Page 492.

MARCH 21 — Cambridge Hospital. Clinicopathological meeting of the staff. Notice above.

MARCH 21 — South End Medical Club. Page 404, issue of March 2.

MARCH 23 — Medical Clinic at the Peter Bent Brigham Hospital. Page 492.

MARCH 27 — New England Heart Association. Notice above.

MARCH 27-31 — American College of Physicians. Page 36, issue of July 7.

MARCH 29 — Tufts College Medical School Alumni Association. Notice above.

APRIL 13 — Pentucket Association of Physicians, 8:30 p. m., Hotel Bartlett, 95 Main Street, Haverhill.

MAY 7-15 — International Congress of Military Medicine and Pharmacy. Page 501, issue of September 29.

MAY 13-16 — American Board of Obstetrics and Gynecology. Page 457, issue of March 9.

MAY 14-20 — American Physicians' Art Association. Page 404, issue of March 2.

MAY 15-19 — American Medical Association. St. Louis, Missouri.

MAY 22, 23, and 24 — American Association for the Study of Goiter. Page 405, issue of March 2.

JUNE 6, 7, 8 — Massachusetts Medical Society. Worcester.

JUNE 12-17 — Symposium on the Public-Health Significance of the Virus and Rickettsial Diseases. Page 125, issue of January 19.

JUNE 26-29 — National Tuberculosis Association. Page 936, issue of December 8.

SEPTEMBER — Boston Psychoanalytic Institute. Page 450, issue of September 22.

SEPTEMBER 11-15 — American Congress on Obstetrics and Gynecology. Page 938, issue of December 8.

SEPTEMBER 15-28 — Pan-Pacific Surgical Association. Page 863, issue of November 24.

FALL, 1939 — Temperature Symposium. Page 218, issue of February 2.

DISTRICT MEDICAL SOCIETIES

ESSEX SOUTH

APRIL 5 — Addison Gilbert Hospital, Gloucester. Clinic at 5 p. m. Dinner at 7 p. m. Speaker: Dr. Ethan Allan Brown. Subject: Allergy.

MAY 10 — Annual meeting. Salem Country Club, Peabody.

NORFOLK DISTRICT

MARCH 28 — Page 493.

SUFFOLK

MARCH 29 — Joint meeting with New England Pediatric Society, Boston Medical Library, 8:15 p. m.

APRIL 26 — Annual meeting in conjunction with Boston Medical Library, at 8:15 p. m. Election of officers. Program and speakers to be announced.

WORCESTER

APRIL 12 — Worcester Hahnemann Hospital. Supper at 6:30; business and scientific sessions, 7:30.

MAY 10 — Worcester Country Club — annual meeting.

BOOKS RECEIVED FOR REVIEW

Chronic Diseases of the Abdomen: A diagnostic system. C. Jennings Marshall. 247 pp. Boston: Little, Brown & Co., 1939. $6.00.

Superfluous Hair and Its Removal. A. F. Niemoeller. 155 pp. New York: Harvest House, 1938. $2.00.

The Complete Guide to Bust Culture. A. F. Niemoeller. 160 pp. New York: Harvest House, 1939. $3.50.

Surgical Treatment of Hand and Forearm Infections. A. C. J. Brickel. 300 pp. St. Louis: C. V. Mosby Co., 1939. $7.50.

Health at Fifty. Edited by William H. Robey. 299 pp. Cambridge: Harvard University Press, 1939. $3.00.

Landmarks in Medicine. Laity lectures of the New York Academy of Medicine. 347 pp. New York and London: D. Appleton-Century Co., 1939. $2.00.

Elementary Anatomy and Physiology. James Whillis. 342 pp. Philadelphia: Lea & Febiger, 1939. $3.50.

William B. Wherry, Bacteriologist. Martin Fischer. 293 pp. Springfield, Illinois and Baltimore: Charles C Thomas, 1938. $4.00.

Clinical Obstetrics. A. Lakshmanaswami Mudaliar. 819 pp. Edinburgh and London: Oliver and Boyd, 1938. 27/—.

Whence? Whither? Why? A new philosophy based on the physical sciences. Augusta Gaskell. 312 pp. New York: G. P. Putnam's Sons, 1939. $2.50.

Everyday Surgery. Lambert Rogers and A. L. d'Abreu. 280 pp. Baltimore: William Wood & Co., 1938. $4.75.

The Essentials of Modern Surgery. Edited by R. M. Handfield-Jones and A. E. Porritt. 1126 pp. Baltimore: William Wood & Co., 1938. $9.00.

Surgical Anatomy. C. Latimer Callander. Second edition. 858 pp. Philadelphia and London: W. B. Saunders Co., 1939. $10.00.

BOOK REVIEWS

Mental Conflicts and Personality. Mandel Sherman. 319 pp. New York, London and Toronto: Longmans, Green & Co., 1938. $2.25.

Psychiatry is coming to an increasing realization that conflict and anxiety are at the center of all types of mental disturbances and that their dynamic and descriptive evaluation furnishes valuable hints for psychotherapeutic adjustment. This realization has been largely the result of the interpenetration of psychoanalytic concepts into psychiatry; for it is psychoanalysis which has emphasized that the basis of the neuroses is a conflict between instinctual drives and the defenses erected against them.

The various chapters of this volume discuss the genesis and nature of conflicts — cultural, social, inferiority and sexual — and the interrelations of these to neuroses and antisocial behavior.

While mental conflicts, as a rule, originate in early life, it is doubtful, however, if the child's conflicts are so few and simple as the author claims, as analyses of children have shown that they manifest very complicated reactions toward the family environment. The author justly criticizes the erroneous idea of congenital homosexuality and points out, as has been so frequently observed, that the difference between the normal and the homosexual individual is quantitative rather than qualitative.

Since the volume is essentially psychoanalytic, it appears to the reviewer that the references to the work of Freud are not sufficiently numerous. The most important chapters for the physician are those on the conflicts and the neuroses, and the conflict basis of antisocial behavior. There are detailed discussions on how the neurotic individual unconsciously maintains his symptoms in order to solve his conflicts, that is, that he unconsciously prefers neurotic misery to actual misery as the lesser of two evils and, by so doing, evades the real problems.

The volume is most welcome as an excellent summary of the present status of the psychology of human conflicts.

Plastic Surgery. Arthur J. Barsky. 355 pp. Philadelphia and London: W. B. Saunders Co., 1938. $5.75.

The author has attempted to present a review of clinical procedures, practiced daily in modern plastic surgery. The method of choice in any group of procedures is generally made clear. Although it should be noted that, in a field as relatively new as this, there is as yet no standardization of methods; hence, methods of choice are always highly personal.

The multiplicity of illustrations and the generally clear and reasonable statement of facts make this book very satisfactory. The material is up to date, and there is a pleasing discretion in the lack of space afforded new procedures which are as yet experimental.

The principles and fundamental theories underlying transplantations are well outlined early in the book. They are clearly presented and an ample bibliography is supplied, just as it is later at the end of each chapter on special topics. The sections on the orbit and nose are particularly good. Similarly it is welcome to find the neck treated in a separate section, since its problems are at times unique.

In conclusion it may be stated that this compact little volume will well repay perusal by anyone interested in the subject of modern esthetic reconstructive surgery.

Les Ondes Électriques Courtes en Biologie. E. Schliephake. 96 pp. Paris: Gauthier-Villars, 1938. 30 Fr. fr.

This concise little text presents in a very lucid style the basic principles of short-wave diathermy and its biologic effects. There is included in the volume a considerable amount of the author's original work. He has, furthermore, presented the dynamics of the electrophysics involved in each system and has correlated these findings with their effects on living cells. The work appears to be truly scientific in scope and is a welcome advance in the somewhat confusing field of physical therapy of today.